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DES MOINES GAS CASE.

The opinion of the United States Supreme Court in the Des Moines Gas Company case, which is reviewed in this issue, is of considerable importance to all classes of utility corporations on account of some of the points involved which have to do with the valuation of utility properties for rate-making purposes. The case is one in which the operating company attempted to enjoin the enforcement of a rate fixed by a municipal ordinance on the ground that the insufficient return afforded upon the property of the company amounted to confiscation.

While all of the points in the dispute cannot be mentioned here, there are several which should not be passed over without emphasis. One of these refers to the paving over the gas mains which were laid in the city streets. Although the valuation which was made by the master in chancery, to whom the case was referred for a determination of the facts, was based upon the cost of reproduction, the master did not allow anything for the cost of this paving, and the Supreme Court upheld him in his view of the case. Since the pipes were laid before the paving was done, this item did not represent any actual investment on the part of the utility company. This attitude upon the part of the court strengthens the point of view that the cost of reproduction is not to be taken in the most literal sense in determining the value of a utility property, but rather is to be looked upon as the means of arriving at the value of that property and the amount of the investment which has been made.

The court indicates very definitely that no allowance is to be made for the value of good will in rate-making cases, thus showing that the change in the personnel of the court since the decision was rendered in the case of the Consolidated Gas Company has not resulted in any change of attitude in this respect. It is, perhaps, well to bear in mind that with respect to both of these items a different point of view might be taken in the case of a valuation for purchase, since both of these elements would in that case have a different bearing upon the value of the property than when the question involved is a determination of the investment which has been made and upon which a fair return must be allowed.

In considering going value, the court emphasizes the point which was made in the Cedar Rapids case, that former earnings may not be capitalized as representing an element of intangible value upon which the rates must continue to provide a return. What

bearing this attitude may have upon the Public Service Gas case, which has been appealed to the Supreme Court from the New Jersey state courts, can only be conjectured; but it would seem to indicate that a recognition of a franchise value based upon previous income may not be expected from the Supreme Court.

With respect to confiscation, it is evident that where the rate of return which is afforded by the revenues of the utility is not less than the legal rate of interest, the idea that any confiscation is involved will not be entertained. The moral to be drawn from this is that utility companies will fare better when they meet municipalities, commissions or the public with a conciliatory attitude and effect some agreement which is fairly satisfactory to both sides, rather than to go into court and contest the case upon the ground of confiscation. Commissions have generally shown a willingness to adjust rates upon a basis which allows a considerably higher return than the legal rate of interest, and the general public will usually acquiesce in the establishment of similar rates.

TENDENCIES IN ELECTRIC SALES METHODS.

Improvement in the sales methods of dealers in electrical appliances may be looked for in many quarters as the similarity between the marketing of electrical and other high-class manufactured products becomes appreciated more widely. To the great credit of the industry, the use of technical terms in this work is now largely avoidable. Potential customers are interested in the performance of equipment, its initial cost and the expense of operation, rather than in points of electrical design which excite the admiration of the engineer. It is sometimes difficult for a man or a woman with technical training to realize the point of view of the public in regard to apparatus. Thus, the factory owner wants a motor which can be thrown into service by a single motion of the operator's hand. He cares absolutely nothing about how this result is attained, and long-winded explanations of the design which permits the immediate connection of the motor to the mains at full voltage are likely to be wasted on the busy customer of this type. If he sends his engineer to inquire into a motor type, the furnishing of complete technical information is of course in order, but thousands of motors are sold yearly without any such analysis. Someone, of course, must be responsible for the technical success of the motor application, but in a great many cases, extended discussion of the engineering problem need not enter into the negotiations with the purchaser.

Five years ago the practice of preparing exhaustive reports on power problems was coming into vogue among central stations. This method was very successful, and led in many cases to the securing of business that probably could have been obtained in no other way. Today not a few companies are finding that precedent and results count for more in the gaining of this class of business than extended technical report work. The installation of the motor drive in a large local factory, perhaps with a reputation extending far beyond the immediate community, counts for more with a good many hard-headed business men than even specific guarantees of operating cost. Such men say, "If Nichols and Smith, with their capital and interests, their organization and national reputation, have concluded that the electric drive is the best thing for their plant, why it's good enough for us!" Working on this line, the central-station sales force determines to its own satisfaction that the electric drive will pay, and instead of preparing a report at a cost of perhaps several hundred dollars, simply writes a brief letter to the prospect confirming the results of its investigations and the deal is closed. In other words, not so much pioneer work is required in a good many cases as compared with a few years ago, and while the determination of the main facts in the problem from the engineering and commercial standpoints is as important as ever, less elaboration is needed in preparing and in presenting the data and conclusions.

Again, in the sale of electric cooking equipment, for instance, the customer wants to know the comparative effort of cooking on an electric range and on a gas stove, or the relative cost of service by fireless cooker and by coal range. Here the central-station solicitor needs to reinforce technical knowledge with practical ideas about the product in the hands of the average person, who wouldn't walk across the street to learn the meaning of a kilowatt-hour, but who will travel a half league in the street cars to find out the recipe and method of producing a golden-brown sponge cake as good as her neighbor's. Good salesmen are appreciative of the "home side" of electrical service; many use electricity themselves, and whenever possible, all employees of the department should be familiar through personal experience with the equipment handled by their company. Among the best solicitors, prospects are not driven to conclusions, but are insensibly led along toward the purchase and are always given the freedom of choice when possible as to equipment types, sizes, etc.

Far-sighted managers are realizing that they need to keep in close touch with the work of their sales staff among the public and that daily or weekly reports by no means tell the whole story. Thus in some companies we find executives locating their desks either in or directly adjoining the appliance exhibit. There is no doubt that closer supervision of sales effort is important in many instances. Progressive managers are paying more attention to the "approach" to the prospective customer, to the details of personal intercourse, promises of subordinates, as-

sumptions regarding working conditions when the equipment is installed, and to the ability of the staff to answer collateral inquiries. Better training of employees means a larger connected load and increased revenue, and it is a good sign that so much attention is now being paid to the so-called "little things" in electrical salesmanship.

SLUDGE IN TRANSFORMER OIL.

It has been shown rather definitely that the sludge which forms in oil-immersed transformers and switches is due to the oxidation of the constituents of the oil. This chemical action proceeds at a rate which is dependent upon the temperature and upon the amount of surface which is exposed to contact with the air. This at once suggests a design involving an airtight case entirely filled with oil, so far as the main compartment is concerned; an auxiliary relief chamber, separate and aside from the normal path of circulation, would take care of changes of volume occurring with change of temperature, and prevent excessive pressures from being produced. While this general idea has been applied in oil switches, where continuous heat dissipation is not a feature, it does not seem to have been applied to transformers, where the oil is in continuous circulation. An air space is almost invariably found at the top of transformer cases, altho the area of contact between air and oil has greatly different values in different models.

If a tight case completely filled with oil is not found practicable, it might at least be feasible with large transformers to fill the space above the oil with some inert gas, such as nitrogen, which would avoid the formation of sludge. A tight case is desirable in any event, for if there is transfer of air between outside and inside sweating is very likely to take place, and the condensed moisture not only lowers the insulating properties of the oil but expedites oxidation.

Probably the greatest disadvantage of sludge is its custom of clogging up the air ducts within the transformer windings, and thus preventing the normal circulation of oil which is essential to the proper dissipation of heat and the prevention of injurious temperatures at times of peak load. Of course a considerable portion of the sludge formed will be deposited in the bottom of the case, but enough usually clings to the windings to seriously interfere with the transfer of heat. The sludge does not usually affect the desirable qualities of the oil, and when it is filtered off the insulation resistance and electric strength will generally be found equal to that of the original specimen. When it is not, the presence of moisture or other foreign matter may reasonably be suspected.

In oil switches the action of the arc upon the oil is of the greatest importance. Arcs cause decomposition of the oil with the production of free carbon. The amount of carbon produced, other things being the same, seems to be greater at lower temperatures than at higher ones. Since the arc itself produces locally a very high temperature, the initial temperature of the oil is not a point of great importance.

TESTING INSULATORS.

Continuity of service over transmission and distribution lines becomes every year of more importance. The growth of load and the existence of contracts which penalize the power company for any failure to provide service, make the value of freedom from interruptions ever greater. The weakest point upon the line, and consequently the most usual source of interruptions to service, is usually found to be the porcelain insulator. This arises from the fact that insulators are designed to have but little electrical strength in excess of that actually required to prevent rupture or flashover, and consequently the factor of safety in this element of the equipment is not as high as in the general design of the mechanical parts. Moreover, insulators have generally been found to depreciate considerably in service and their reliability after several years of operation is not as great as at the time of original installation. This depreciation from the original condition of operation, combined with extensions of the system which place dependence upon larger and larger numbers of insulators, naturally leads to an increased frequency of insulator failures, and consequent interruptions to service.

Studies in porcelain manufacture and a greater experience with electrical porcelain which has been exposed to high-voltage line conditions, have led to considerable improvement in the quality of porcelain manufactured for this purpose; but large numbers of insulators of earlier manufacture are, of course, still in service. Failures of these insulators usually arise from mechanical defects. Slight cracks in the glaze or other imperfections which originally are not sufficient to cause breakdown may eventually lead to such a result. If routine tests can be made upon insulators in service, such weak members can be detected and eliminated before they give rise to serious trouble.

A policy of making regular tests of line insulators in service has consequently been adopted by a number of companies with very satisfactory results. While such tests usually involve some interruption to service, such interruption can be made at the time when it is least objectionable, which is decidedly preferable to letting the interruption or breakdown come at the time when chance or severe conditions may direct. The faulty insulators can easily be eliminated and replaced when their condition is once detected. As a method of test for this purpose, the application of a high-frequency, high-voltage test, such as can be made by the use of a Tesla transformer, seems to be the most effective and convenient. Portable apparatus is now available for carrying on such tests, which can be made without difficulty. Apparatus is, moreover, available at the present time by which insulators may be changed even upon a live line, after it is once determined that replacement is necessary. The possibilities of keeping high-tension lines in operation continuously has thus been greatly increased as compared with a few years ago.

American Institute Directors Meet.

The Board of Directors of the American Institute of Electrical Engineers held its first meeting of the administrative year which began on August 1, in New York City, on Tuesday, August 10.

President Carty announced his appointments on the various Institute committees for the administrative year beginning August 1, 1915. The chairmen of the committees appointed are as follows: Finance, J. Franklin Stevens, Philadelphia, Pa.; Library, Samuel Sheldon, Brooklyn, N. Y.; Meetings and Papers, L. T. Robinson, Schenectady, N. Y.; Editing, H. H. Norris, New York City; Board of Examiners, A. S. McAllister, New York City; Sections, H. A. Hornor, Philadelphia, Pa.; Standards, C. A. Adams, Cambridge, Mass.; Code, Farley Osgood, Newark, N. J.; Law, G. H. Stockbridge, New York City; Power Stations, C. F. Uebelacker, New York City; Transmission, P. H. Thomas, New York City; Railway, D. C. Jackson, Boston, Mass.; Protective Apparatus, E. E. F. Creighton, Schenectady, N. Y.; Electric Lighting, Clayton H. Sharp, New York City; Telegraphy and Telephony, G. M. Yorke, New York City; Industrial Power, David B. Rushmore, Schenectady, N. Y.; Use of Electricity in Marine Work, C. S. McDowell, New York City; Electrochemical, A. F. Ganz, Hoboken, N. J.; Electrophysics, John B. Whitehead, Baltimore, Md.; Records and Appraisals of Properties, Philander Betts, Newark, N. J.; Educational, V. Karapetoff, Ithaca, N. Y.; Public Policy Committee, Calvert Townley, New York City; Development of Water Powers, Calvert Townley, New York City; Patent, Ralph D. Mershon, New York City; Membership, W. A. Hall, Lynn, Mass.; Historical Museum, T. C. Martin, New York City; U. S. National Committee, International Electrotechnical Commission, C. O. Mailloux, New York City; Relations of Consulting Engineers, L. B. Stillwell, New York City; Code of Principles of Professional Conduct, George F. Sever, New York City; Hazards from Lightning, Elihu Thomson, Swampscott, Mass.; Reserve Corps of Engineers, Bion J. Arnold, Chicago, Ill.; Constitutional Revision, Bancroft Gherardi, New York City. Representatives were also appointed on various joint committees and other bodies.

The Board also confirmed the appointment by the President of the following members of the Edison Medal Committee for terms of five years each: Carl Hering, Harris J. Ryan and H. G. Scott.

The Board elected from its own membership the following members to serve upon the Edison Medal Committee for the term of two years, to fill the places of members whose terms had expired: B. A. Behrend, Paul M. Lincoln, and William McClellan. Farley Osgood was elected for the term of one year to fill a vacancy on the committee.

The Secretary reported that since the last meeting of the Board the Executive Committee had unanimously voted to increase the Institute's guarantee towards the expenses of the International Engineering Congress from $3,500 to $5,000, thereby placing the Institute upon the same financial basis in relation to the Congress as the American Society of Mechanical Engineers and the American Institute of Mining Engineers. The Institute's limited participation in the Congress had been due to the fact that at the time the original action was taken in June, 1912, the Institute had guaranteed the entire expenses of the International Electrical Congress, which has since been indefinitely postponed. The Board unanimously ratified the action.

The resignation of A. M. Hunt as one of the Institute's representatives upon the Committee of Management of the International Engineering Congress, due to his removal to the East, was accepted with regret, and a resolution expressing appreciation of his valuable services to the Institute while on the committee was adopted.

The increase from limited to full participation in the Congress entitles the Institute to the full complement of representatives upon the San Francisco Committee of Management; that is, an increase from two to four representatives, which with the resignation of Mr. Hunt, made necessary three additional appointments. President Carty appointed Harris J. Ryan, A. H. Babcock, and H. A. Lardner. These appointees, together with J. T. Whittlesey, previously appointed, complete the Institute's representation.

Upon recommendation of the Board of Examiners 48 applicants were elected to grade of Associate, 12 students were ordered enrolled, 5 members elected, 19 Associates transferred to grade of Member, 4 Members transferred to grade of Fellow.

Naval Radio Stations.

The United States Navy Department now has in operation a total of 47 wireless stations. Of these 30 are in continental United States and 17 in the island possessions, Alaska, Canal Zone, and foreign naval stations. Of these 47 stations 21 are open to commercial service, and the others are reserved exclusively for official naval business.

Central Stations of Southern Illinois Organize.

Representatives from sixteen central stations in southern Illinois met at Centralia on August 12 to effect an organization. This is intended merely as an auxiliary to the Illinois State Electrical Association, and not as a substitute therefor. The downstate men have never had much enthusiasm in the state meetings, and it is felt that an organization from a smaller section will be more beneficial.

At this meeting the following officers were elected: K. A. Steinhauser, Nashville, president; F. J. Higgins, Centralia, vice-president; Cale Gough, Sparta, treasurer. Another meeting is to be held in October, and subsequent meetings every six months thereafter. The organization will not be finally completed until the next meeting.

The day was given over to the preliminary organizing and to a discussion of the various problems which confront the central-station operator. Representatives from the General Electric Company, Westinghouse Electric and Manufacturing Company, Western Electric Company, Commercial Electric Company and Electric Appliance Company were there with a feast for the boys. The utilities represented were those at Albion, Centralia, Effingham, Farina, Chester, Coulterville, Christopher, Mt. Carmel, Mt. Vernon, Nashville, Murphysboro, Alto Pass, Collinsville and Sparta.

Engineers Advocate Department of Engineering and Public Works for New York.

Following the representations made in hearings, the committee of engineers, organized to present matters to the Constitutional Convention of New York State, has written the Committee on Governor and other State Officers urging that its recommendations, embodied in an amendment introduced by A. R. Latson, be adopted.

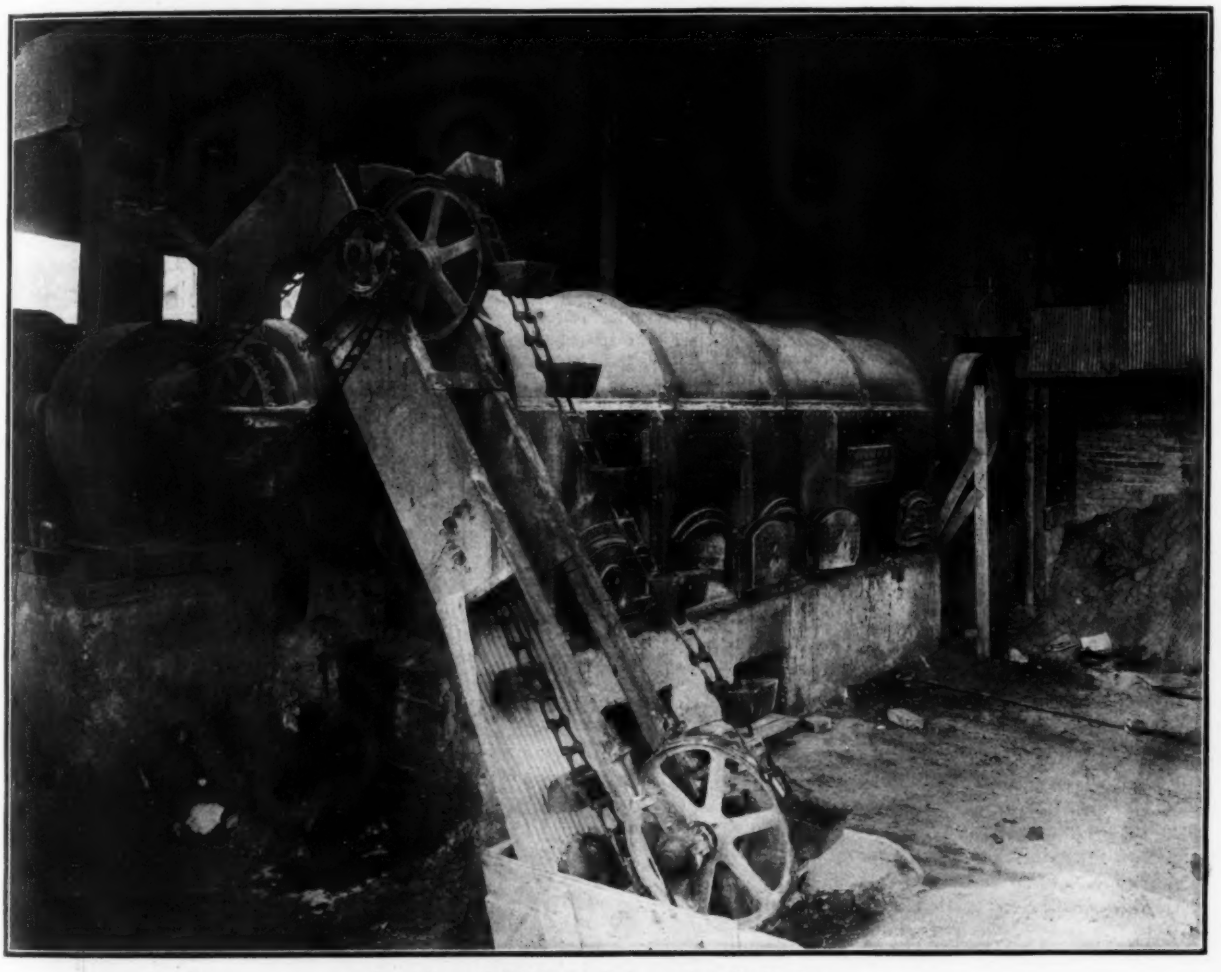
These recommendations provide for the abolishment of a number of existing departments and their consolidation into a department of engineering and public work, which would have charge of all public lands, state buildings, parks, roads, canals and of the conservation and development of the natural resources belonging to the state. The offices of state engineer and surveyor, commissioners of the land office and the canal board would be abolished, their duties being transferred to the new department.

This plan would insure continuity and consistency of policy by the provision of three commissioners instead of a single head to administer the department.

Electricity in Stone Quarries and Asphalt Plants.

This article comments on the economies and advantages of electric motor drive for stone quarries and asphalt plants and describes in detail the motor equipment in four typical establishments in Auburn, N. Y., which purchase power from the local central station.

Electric drive is peculiarly adapted to stone-quarry and asphalt-plant machinery for several reasons. This class of work is more or less intermittent, depending a great deal on seasonable weather, as the products of such plants are mostly used for paving and construction work. Where steam plants are maintained for power purposes the salaries of engineers and firemen continue whether the plants are in operation or not, and there are always incidental expenses and depreciation to be considered. The remarkable saving secured by adopting electric drive is clearly shown in the case of one plant described in this article, which was formerly operated by steam power.



Sand Dryer With Motor-Driven Feed Mechanism.

The following descriptions relate to four stone quarries and an asphalt plant in the city of Auburn, N. Y. All of these plants use electric power purchased from the Empire Gas & Electric Company, which furnishes gas and electricity to a number of cities through central New York. This company uses Niagara Falls and Salmon River power and also operates two auxiliary, steam, generating stations.

There is a peculiar geological formation in the vicinity of Auburn where blue and gray limestone is found in great quantities. The gray limestone is used principally for building purposes, but the blue limestone is crushed to various sizes for construction work of all kinds. The power is delivered to the quarries at 2,300 volts from three-phase 25-cycle transmission lines where it is reduced to 220 volts for some of the motors, others using the primary voltage.

Before taking up the description of the various equipments it may be well to outline the general mechanical equipments of quarries and asphalt plants to give a better understanding of the electrical equipment. The general arrangement used in the typical plant is to place the motor, stone crusher and the countershafts in a room or excavation below the ground level. A bucket elevator extends from this room to the top of the stone house and is driven by a system of sprocket wheels and sprocket chains extending from the countershaft to about half the height of the elevator. A sprocket wheel is attached to the shaft projection at the upper end of the elevator and is connected to the driving gear of the screen by a sprocket chain. The motor is generally belted to the countershaft.

The sequence of operations is as follows: The stone is brought from the quarry in cars, or by conveyors,

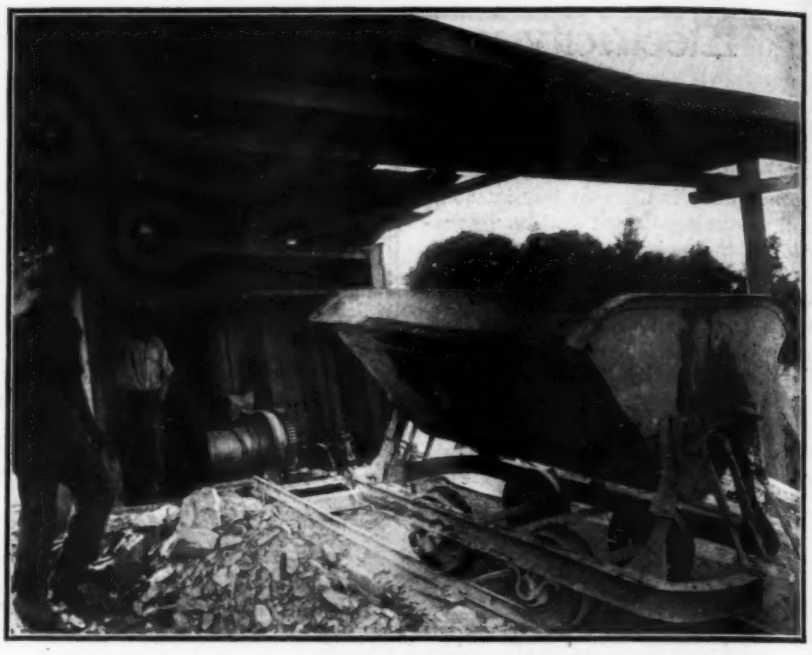
and is fed into the top of the crusher. The latter discharges into a trough which empties into the bucket elevator and the crushed stone is elevated and emptied into the screen. Here it drops through the various size screens in the rotary screen and descends by gravity to the storage bins. From the bins the stone is drawn out through chutes to wagons or cars. The screen usually is cylindrical in shape and is mounted so that it is at a slight angle with the horizontal plane. The stone is fed in at the high end and gradually works toward the lower end as the screen revolves, dropping through the different size meshes and holes, automatically assorting itself into the various sizes. Some screens provide for four sizes of crushed stone, others six. In the former case the grades range from the size of a pea up to about three inches, and in the latter from dust up to about three and one-half inches.

In the typical asphalt plant there are usually two general kinds of paving material prepared, the ordinary asphalt pavement, consisting of sand and asphalt and the Bithulectic pavement, composed of a mixture of sand, crushed stone and asphalt. The asphalt is melted in tanks placed above furnaces and is mechanically stirred by compressed air. The sand and stone is heated to a temperature of about 350 degrees Fahrenheit in rotary driers and elevated by a bucket elevator to a screen, similar to those used in the stone-crushing plants, where the material is deposited in storage bins. From the bins it is drawn into a self-weighing hopper and passes into an agitator where it is mixed with the melted asphalt and descends to the wagon waiting below.

It is general practice to locate the dryers, motor, and countershaft on the ground floor of the building, as well as the furnaces for heating the asphalt. The furnaces underneath the dryers operate by suction draft by means of fans belted to the countershaft. On the second floor are located the weighing hopper, asphalt tanks, agitator, and the conveyor for carrying the melted asphalt from the tanks to the agitator. The agitator consists of a number of interlocking paddles, the rotation of which mixes the ingredients.

Description of Plants.

The Auburn city quarry furnishes stone for macadamized streets, in four sizes, designated as Nos. 1, 2, 3 and 4, which range in size from that of a pea up to 3.5 inches. A Westinghouse 50-horsepower 220-volt motor furnishes power to the following group of machines: No. 5 Austin stone crusher with a capacity of 300 tons in 8 hours; bucket elevator with similar capacity extending from the crusher to the 36-inch screen at the top of the building,



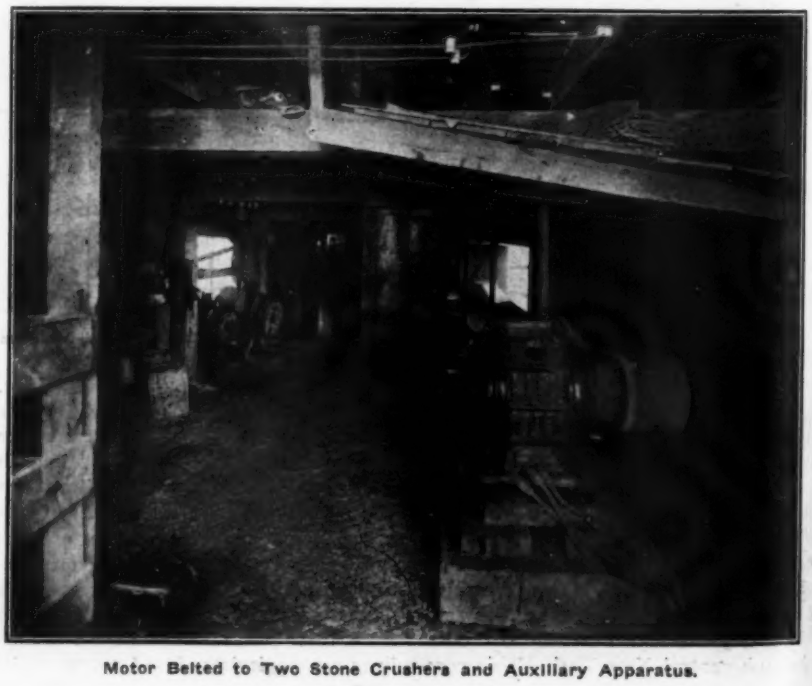
Five-Horsepower Motor Driving Hoist for Hauling Cars From Quarry.

and the screen itself. The stone is brought from the quarry to the crusher by small cars manually operated.

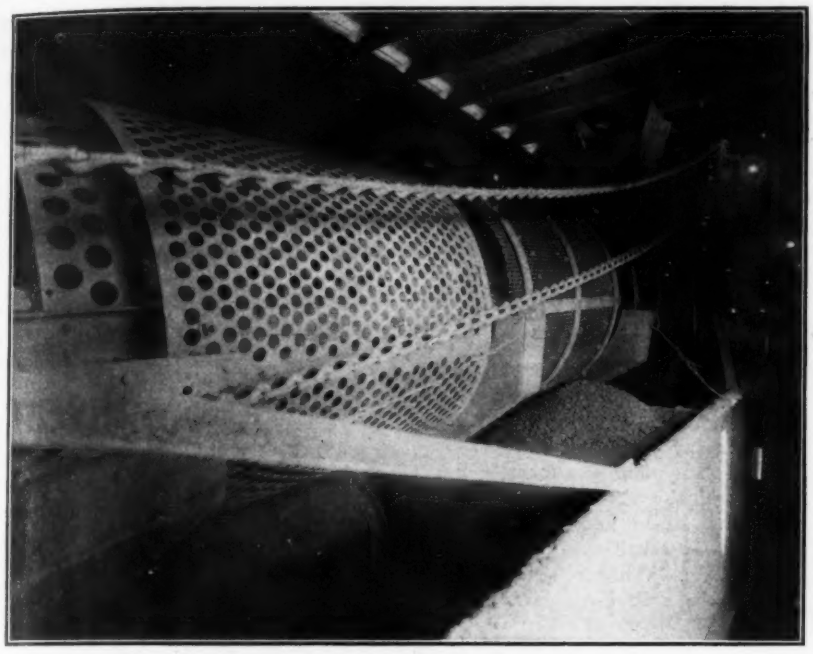
Three transformers are installed at this quarry, set on double crossarms, one on either side of the pole and protected by a rain shield.

The G. B. Lewis quarry is similar in equipment to the city quarry with the exception that the stone is supplied to the crusher by a motor-driven jib hoist, controlled and operated by a drum hoist and cables. Here the stone crushing plant is located on a side hill so that the crusher is in the open under the loading platform instead of below the ground. A 25-horsepower, 220-volt General Electric motor operates a McCully stone crusher having a capacity of 175 tons in 10 hours; a bucket elevator having the same capacity and a 36-inch screen. Five sizes of stone are furnished by this plant, from dust up to 3.5 inches. The jib hoist is operated by a 10-horsepower General Electric induction motor operating at 220 volts. The hoist is rated at two tons and has a sweep of about 75 feet.

In some respects the business of the Rock Cut Stone Company, also of Auburn, is different from that of the other quarries. Most of the output is shipped from the city by means of a spur of the New York Central Railroad. All grades



Motor Belted to Two Stone Crushers and Auxiliary Apparatus.



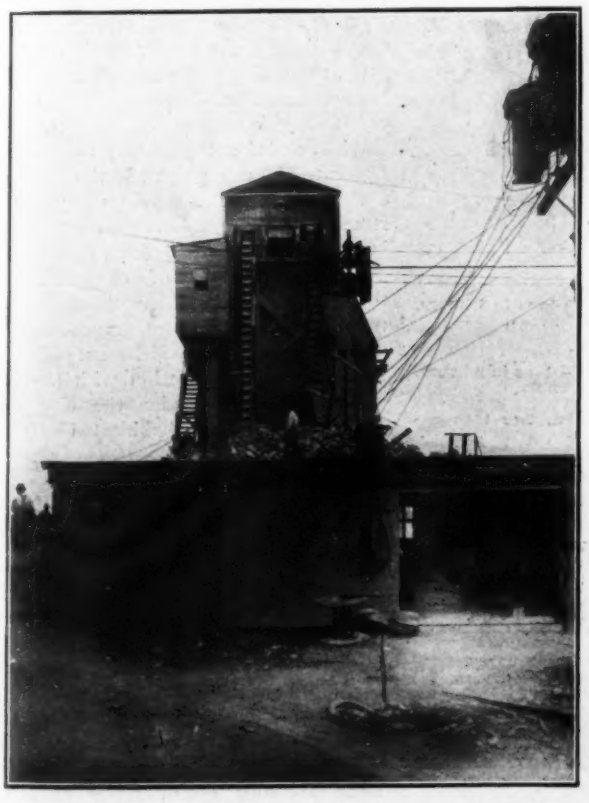
Motor-Driven Screen in Asphalt Plant.

of crushed stone are produced for general building construction, concrete, paving and railroad ballast. One of the features of the business is pulverized stone, which is used as a fertilizer. The quarry is located about 500 feet from the stone-crushing plant, and the stone is brought to the crushers by a Lidgerwood steam-driven hoist and carrier. All other machinery in the plant is motor driven.

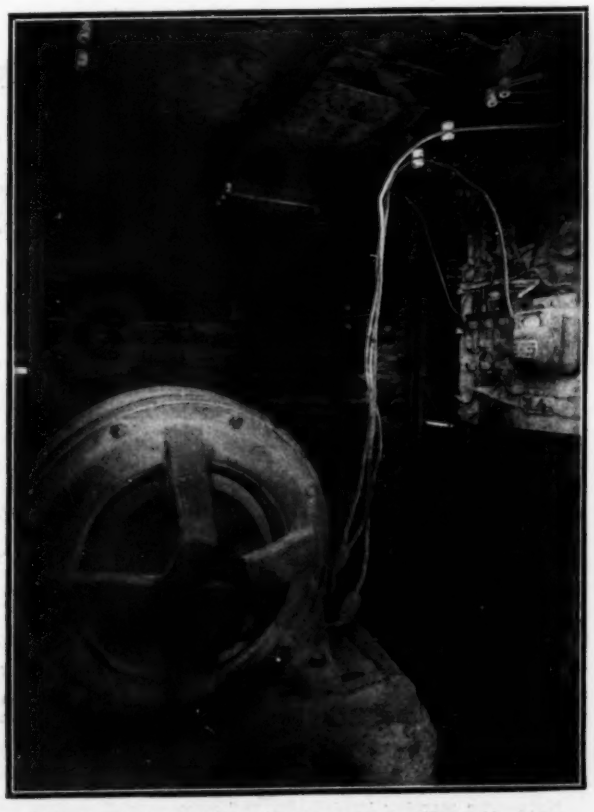
All of the stone is crushed by two Climax stone crushers with a capacity of 325 tons each in 10 hours, driven by a 50-horsepower 2,300-volt General Electric induction motor by means of belting and countershafts. This motor also operates a bucket elevator and two screens, a 36-inch and a 42-inch, respectively. Five sizes of crushed stone are produced, from dust to about 3.5 inches. The bucket elevator has a capacity of 325 tons in 10 hours. A second Climax bucket elevator of the same capacity and serving the other crusher is belt driven by a 20-horsepower 220-volt General Electric induction motor. The pulverized stone for fertilizer is prepared by a Jeffrey stone pulverizer belted to a 50-horsepower 2,300-volt General Electric induction motor. The pulverizer has a capacity of 10 tons per hour. A screw conveyor driven by a 10-horsepower 220-volt induction motor conveys the pulverized stone from the pulverizer to the storage bins. The dust from the screens is used for surfacing macadamized streets and in the place of sand for some purposes.

A unique feature of this company's equipment is the lighting system. This is an important feature, as the plant is at present operating 24 hours a day. Outside of the stone house on the conveyor end there is a 500-candlepower tungsten lamp provided with a white-enameled reflector. Three similar units of 400 candlepower are located in the screen loft, and three on the side of the building along the railroad siding. The quarry is illuminated by portable lights, consisting of 1,000-watt nitrogen-filled lamps with white-enameled reflectors mounted on standards. These outfits can be placed where needed and the flexible cable is carried on ordinary garden-hose reels.

Brayer Brothers are general contractors for municipal improvements,



Stone-Crushing Plant With Electrically Operated Bucket.



Motor for Driving Stone Crusher and Auxiliary Machines.

including asphalt pavements, sewers, electric subways, etc. Their plant includes a quarry, stone-crushing plant, and an asphalt plant. In the general arrangement the stone-crushing plant is similar to the Lewis and the city quarries. A 25-horsepower 220-volt Westinghouse induction motor operates the following group of machines: Climax stone crusher with a capacity of 280 tons in 10 hours; a bucket elevator of the same capacity and a 36-inch screen. Four sizes of crushed stone are produced at this plant.

When running full capacity for 10 hours a day the cost of current is $4.00 per day. The rate for current for the stone crushing plants is $25 per month, flat rate, plus two cents per kilowatt-hour, subject to a discount of 10 per cent for payment within 10 days.

At the asphalt plant of this firm, which is located near the quarry, a specialty is made of the Bithulectic pavement. The general arrangement of the plant is similar to that of the one previously described. Sand and six sizes of stone mixed with the melted asphalt constitute the ingredients. Six sizes of stone, ranging from dust to one inch are used. The object of using the various sizes is so that the fine stone fills in between the larger stone and when compressed by the roller a practically solid mass is formed.

There are three asphalt tanks for melting the asphalt, each having a capacity of 30 barrels. When the asphalt reaches a temperature of about 275 degrees Fahrenheit it is mechanically stirred or agitated with compressed air furnished by an Ingersoll-Sargent 8-inch by 14-inch single-acting air compressor belted to a 5-horsepower 220-volt induction motor. The asphalt is transferred from the tanks to the agitator by a self-weighing conveyor. The sand and stone are heated to 350 degrees Fahrenheit in two Hetherington & Bemer dryers, one left-hand drive and one right-hand drive.

The sand and stone are discharged into bucket elevator and carried to the screen loft where there is a screen similar to that used in the stone crushing plant. Here the sand and stone are separated into six different sizes and distributed to the bins. From the bins the material is drawn off through a self-weighing hopper and discharged into the agitator. All of this apparatus is group-driven by a Westinghouse 25-horsepower, 2,300-volt induction motor. The plant has a capacity of 195 cubic yards per day of 10 hours.

The asphalt plant was formely steam driven and the comparative cost between the steam and electric power shows a remarkable saving in favor of the latter. When operating to full capacity the cost for current for the asphalt plant is approximately $5.00 per day. The rate for current is $30.00 monthly flat, plus 1.5 cents per kilowatt-hour, subject to a discount of 10 per cent if paid within 10 days. The cost of steam power was as follows: Engineer, $3.00 per day; fireman, $2.00 per day; one ton of coal per day, $3.60 or a total of $8.60 per day. This figure does not include incidentals, depreciation or repairs, so that the net saving when operating full time is approximately $100 monthly. The asphalt plant operates under peculiar conditions, as during storms or inclement weather, asphalt cannot be laid and the plant must stand idle. When the steam plant was used the pay of the engineer and fireman continued, but with electric drive the cost for power ceases when the plant stops operation. The accompanying table gives the motor data for all of the plants.

QUARRY AND ASPHALT PLANT MOTOR DATA.
Three-Phase, 25 Cycles.

No.	Horsepower	Kind of Drive	Voltage	Application
				CITY QUARRY.
1	50	Group	220	No. 5 Austin stone crusher, 300 tons in 8 hours. Bucket elevator, 300 tons in 8 hours. 36-inch screen.
				G. B. LEWIS QUARRY.
1	25	Group	220	No. 3 McCully stone crusher, 175 tons in 8 hours. Bucket elevator, 175 tons in 8 hours. 36-inch screen.
1	10	Belt	220	Drum hoist operating jib hoist, two tons capacity.
				ROCK CUT STONE COMPANY QUARRY.
1	50	Group	2300	Two Climax stone crushers, 325 tons each in 10 hours. Climax bucket elevator, 325 tons in 10 hours. One 36-inch screen. One 42-inch screen.
1	20	Belt	220	Climax bucket conveyor, 325 tons in 10 hours.
1	50	Belt	2300	Jeffrey stone pulverizer, 10 tons an hour.
1	10	Belt	220	Screw conveyor, pulverizer to storage bins.
				BRAYER BROTHERS' QUARRY AND ASPHALT PLANT.
1	25	Group	220	Climax stone crusher, 280 tons 10 hours. Bucket elevator, 280 tons 10 hours. 36-inch screen.
1	3	Belt	220	Drum hoist for hauling cars from quarry.
1	25	Group	2300	Two Hetherington & Bemer sand dryers, 195 cubic yards in 10 hours. Three bucket elevators. One screen. Two Sturtevant fans. One agiator.
1	5	Belt	220	Ingersoll-Sargent 8 by 14-inch single-acting air compressor for stirring asphalt.

Note—The seeming irregularity in horsepower of motors for similar applications in one or two instances is for the purpose of providing for future extensions.

Utilities Affected by Flood-Prevention Activities.

The municipal light plant at Osborn, O., is to be permanently abandoned. The same holds true of the local telephone exchange. Further, the Ohio Electric Railway Company, which has served Osborn for many years, will tear up its tracks leading into that town, and will know it as a station no more.

The cause for all this lies in the fact that Osborn, with its 1,300 inhabitants, and a history dating back to 1850, is to be scrapped, or wiped from the map in its entirety, by the hand of man. Such ruthless act is a necessity of the Miami valley conservancy district plans, which are to protect the city of Dayton and surrounding points from a repetition of the great flood of 1913, which caused large sacrifice of life and the loss of millions of dollars in property.

The location of Osborn with respect to the proposed engineering enterprise is such that it would require an approximate outlay of over $1,000,000 to protect it from the increased danger to which the community would be subject by reason of the improvement. It was decided that it would be a cheaper and more satisfactory solution to buy the town outright. The sale has just been consummated with the people of Osborn through their municipal officials.

New Contract at Columbia.

Extensive improvements are to be made in the plant and service of the Columbia (Tenn.) Water & Light Company, according to an agreement which has been reached between the city and the utility company of which J. S. Robinson is secretary and superintendent. The agreement, in the form of a written contract, provides for a new street-lighting system, with 80 lamps instead of 60 as heretofore, and lamps for a White way of 60 poles, and the city is to renew the lighting contract with the company. Improvements at the power plant will be extensive, it is stated. In connection with the improved lighting service the city will get filtered water, rehabilitated system, etc.

"Made in Lockport" Windows.

The Lockport (N. Y.) Light, Heat & Power Company has been giving up its windows to a series of "Made in Lockport" displays, and each manufacturer of the city has been invited to exhibit his product as an educational feature for the benefit of the public. Manufacturers have responded gladly, and some very elaborate displays are being exhibited, attracting much attention and receiving considerable comment from the local newspapers.

Commercial Practice
Management, Rates, New Business

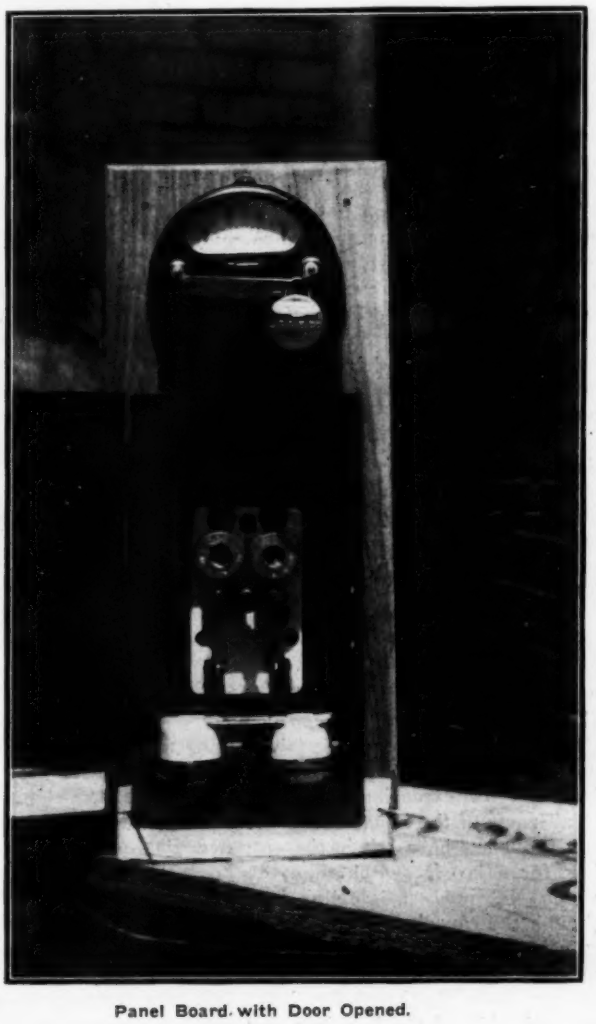
Furnishing Electric Service in Louisville for $2.99.

A panel board, complete with meter and switch connections, which can be installed in any house at a cost to the customer of $2.99, is announced by the Louisville Gas & Electric Company. It was perfected after two or three weeks of experiments with collections of meters, switches, conduits, switch boxes, etc., conducted by Robert Montgomery, manager of the commercial department of the company. He was endeavoring to develop a panel board of which the initial cost would be so small that it would appeal to a large number of possible users of electricity who cannot afford present installations.

The panel board is small, neat, and will serve not only as a temporary installation but will supply the basis for complete wiring later on for the whole of any house in which it is installed. That is the principle on which it is being put out, for the company, as well as the contractors who make the installations would actually lose money if operations went no further than mere installation of the panel board. The board goes out on the guarantee of an electricity bill of at least 50 cents a month.

It consists of a wooden panel about 20 inches long and 7.5 inches wide, beveled on the edges, on which is fastened, at the top, a General Electric meter, type I-14, and a standard steel entrance box, 4.5 inches deep and 6.5 by 10 inches in other dimensions, with the top punched out so that it will slip closely over the terminal box of the meter. The box is firmly fastened to the board beneath the meter, and the conduit inserted through a hole in the bottom of the box and bored through the panel, the end of the conduit being capped. Inside the box the porcelain switch is fastened, just below the conduit, the particular switch being a Bryant, 30 ampere, 125 volt. Two sockets are provided at the bottom of the box, being firmly attached. Five knockout holes are provided for on each side, and two at the bottom.

Inexpensive Panel Board Developed by Louisville Gas & Electric Company.



Panel Board with Door Opened.

The board will be handled in this manner: The customer who orders one installed signs a contract for the service. He binds himself to use at least 50 cents worth of current each month and pays the salesman $2.99 in cash. The commercial department in turn passes the contract on to the contractor who will install the service, pays him $2, retaining the 99 cents, and delivers him a panel board. Then the contractor makes the installation, attaching the panel board to an outside wall of the building and drilling through to the outside, thus conducting the conduit up to the eaves or to some point where the company can establish the service-wire connections, wires, etc., being ready to tie to. The panel-board sale provides for delivery of one 60-watt lamp and a 12-foot attachment cord, suitable for a fan, iron, percolator, etc.

By this deal the Gas & Electric Company loses exactly 19 cents on every board, though it may be figured that it is relieved of installation of the meter, which it is estimated would mean a cost of forty to fifty cents. The service connection cost, however, generally will run to more than the net returns from the installation in the way of current for a year, but, as has proved the case in other cities, with panel boards costing more money, it is virtually assured that this entering wedge will result in contracts to extend the wiring. On the other hand the contractor who makes the installation can pretty certainly be counted on to solicit for further extensions, or if he is handling appliances, will frequently be able to place a fan, an iron or some other appliance which will put him ahead even at the outset.

It is expected that these boards will frequently be installed in the rooms in which they are to be used and they will be painted a dull black, board and all, so as not to be too conspicuous. Consideration will also be given the probability of these original panels being used for extension of the service to all parts of the house. For this reason room has been left in the entrance box for a larger switch than the one which is now originally installed, though the capacity of this one will be sufficient for most houses. The armored cables or conduits could easily be run from the knock-out holes left on each side of the box into the wall or along it to a concealed conduit.

The first announcement of the new board was made by the Louisville company in the Sunday morning papers of June 20, large space being used. A drawing showing the device, with a combination of appliances, was featured in the center of the ad, while on each side the price was displayed. On one side the display read: "$2.99 puts electric service in your home," and the other: "$2.99, panel board complete with 60-watt Mazda lamp."

Then followed the statement of the proposition, pointing out the plan in detail and describing the lamp and attachment cord, the two sockets and suggesting the combinations available: lamp and fan; lamp and iron, percolator or any combination of any two electrical appliances. It was stated that it was made possible to make the proposition "in co-operation with the contractors and dealers of Louisville, basing the offer upon a justified anticipation of volume of sales." The panel board was referred to as the nucleus for complete electrical service and the following sentence was displayed in bold-faced type:

"Tenants whose landlords will not wire their homes may provide themselves with electric service by means of the panel board, moving the panel board when they move."

Much interest was taken in the proposition and the suggestion carried in the display ads that the commercial department of the company be called was very largely acted upon. The first 50 of the boards were made up in the company's own shops, the cut out in the tops of the boxes being accomplished with cold chisels. The order for the next 500 of the boxes provided that the holes be punched out. It may be noted that the plan of using the ordinary, standard form of boxes, permits the company to attach a name plate to the front of the box, the name of the company and the telephone number only appearing in brass against a black background.

Electrical men are free in expressing the opinion that it is exceedingly practicable and that it is an improvement on any other boards of the kind they are familiar with.

Successful Lighting Installation for Public Tennis Court.

What is said to be the first electrically lighted tennis court provided for and maintained by the city, and also the first court lighted by exclusively overhead lights, has just been thrown open to players in Louisville, Ky. This court is one of the several located in Central Park and the first night game, several of the city's best players participating, was played on the night of August 4. The cost of the installation and maintenance was borne by the Board of Park Commissioners, this being an experimental installation, which, if successful, will be followed, it is said, by as many as 20 others in the parks of the city.

Night View of Tennis Court.

Four 1,000-watt type C Mazda lamps, hung 30 feet above the court, on 28-foot centers, supply all the light. Each lamp is equipped with a B-33 1,000-watt Holophane reflector. The arrangement of the lamps puts the two interior lights about half way between the service line and the net, while the remaining lamps are suspended over points back of the base lines of the court. Two poles serve to carry the outfit, properly guyed and in such a way that the guy wires are back of the backstop nets. A double-pole, single-throw, fuse switch, 60 amperes, serves to control the current, which the Louisville central station supplies.

Prize Contest Stimulates Utility Salesmen.

The Malden Electric Company, Malden, Mass., is conducting a prize contest among its employees, to the end of securing 10,000 meter installations by January 1, 1916. On August 10 more than 8,700 meters were installed, the schedule laid out for each month being almost lived up to. On the wall of the company's office is a large dummy clock, laid out in monthly and weekly sections, to denote progress. The minute hand is set forward from time to time to show the actual meters installed on that date, while the hour hand indicates the number due to be installed to keep up with the schedule.

A prize is awarded the employee who secures the most successful prospects each month.

Central Station Sells Electric Sign to Competing Gas Company.

The accompanying illustration shows a unique side of the application of electricity for advertising purposes.

This electric sign was recently sold by the Wichita Falls (Tex.) Electric Company to the local gas company, which is a competing concern. The sign is equipped with a flasher which causes the letters G A S to be extinguished, at the same time lighting

Electric Sign Used by Gas Company.

other lamps which illuminate this square place on which is painted a large red gas meter. The effect produced is particularly good.

Other electric signs which may be seen in the illustration testify to the aggressiveness of the sales organization of the Wichita Falls Company.

Central Station Adopts Attractive Emblem.

"Service" grouped around "power" and "light" are the symbols displayed in an emblem recently adopted by the Texas Power & Light Company, Dallas.

The company has been using the slogan "Service First" for some time but has been using it in connection with a

New Emblem of Texas Utility.

five-point star and circle with the letters T. P. & L. inscribed in the inner part of the star.

When the new design, showing the State of Texas in silhouette with a motor and late type of electric lamp brought out in white and the words "Service First" conspicuously displayed, was first submitted, it met with immediate approval.

Besides displaying conspicuously the State of Texas the emblem brings out strongly the "Service First" feature which is the big idea behind this organization. This slogan by no means is intended to minimize the importance of the well known "Safety First" as is shown in a statement made by F. R. Slater, general superintendent of the company, in a recent issue of "Kilowatts," an employees' monthly house organ, which says "True service cannot be rendered unless due regard is paid to safety."

The new emblem will be prominently displayed in newspaper advertisements, on the company bills and letter heads and on the business cards of the employees.

Youngstown Places New Street-Lighting System in Service.

The new street-lighting system at Youngstown, O., was formally put into service on Wednesday, August 18.

The new installation consists of about 3.5 miles of underground wiring in the downtown district, through which current is supplied to 545 600-candlepower 20-ampere series Mazda C lamps, each operated through a separate series transformer which insulates the lamp standard from the high potential of the main circuit. There is an addition to the ornamental-standard system employed in the downtown section, 185 miles of overhead wiring in the residence district which supplies current to 3,200 100-candlepower 6.6-ampere series Mazda C lamps.

The entire system was installed by the Mahoning and Shenango Railway and Light Company, of Youngstown.

Central-Station Company Encourages Customers to Advertise for Business.

In order to create customer good will and incidentally increase the power consumption at various gins operated electrically, the Texas Power & Light Company is employing a unique method of advertising.

A letter calling attention to the advantages of electric operation was recently sent to all electric ginners in the company's territory, together with a press proof of the advertisement illustrated herewith. At the same time a copy of this letter and ad was sent to newspapers in the various districts, calling attention to the fact that this letter had been sent to electric gins and suggesting that they follow it up and try to get some advertising business.

It is expected that the idea will produce good results, because in the first place it shows the ginner that the company is trying to help him get more

Bring Your Cotton
TO
(Name of Your Gin Here)
ELECTRIC GIN
We have the most up-to-date ginning equipment and can assure customers
Quick Service
RAIN OR SHINE
Bring your next bale to our gin and let us show you our prompt service and good sample
(Name of Your Gin Here)

Advertisement Suggested by Central Station.

business. The friendly tip to the newspapers will no doubt cause good feeling, and the advertising when run will not only cause the company to sell more current but will also be an indirect appeal to steam gins to use electricity, and thus have "Quick Service" facilities.

St. Louis Company Reduces Rates.

In a half-page advertisement in all St. Louis papers of August 13, the Union Electric Light & Power Company announces substantial deductions in electricity rates for both lighting and power, effective September 15, 1915. The primary residence rate which is based on a specified kilowatt-hour consumption per active room has not been changed but a reduction has been made in the secondary rate, the charge now being three cents per kilowatt-hour for all use in excess of seven kilowatt-hours per month per active room.

The commercial lighting and power rates have been reduced and the following schedule will go into effect:

		Per kilowatt-hour
First	200 units use during month at	10 cents
Next	200 units use during month at	8 cents
Next	200 units use during month at	6 cents
Over	600 units use during month at	4 cents

In addition the monthly minimum will be reduced to $1.00 for both light and power. The foregoing rates will be reduced one-half cent per kilowatt-hour without lamp renewals.

The new exclusive power schedule will be as follows:

		Per kilowatt-hour
First	200 units use during month at	6 cents
Next	200 units use during month at	5 cents
Next	200 units use during month at	4 cents
Over	600 units use during month at	3 cents

The monthly minimum will be reduced from 75 cents to 50 cents per horsepower.

In connection with further reductions the company makes the following statements in its advertisement.

"The supplying of electricity to the entire population of a city such as St. Louis involves a very large investment and plant, each customer is also an element of not only investment cost, but service expense, in addition to the cost of operation to generate the electricity and its delivery—with the increased use and growth of the business, lower operating costs are made possible.

"The total number of residences in the City of St. Louis aggregate approximately 120,000, of which at the present time 33.33 per cent, or, in round figures, 40,000 use "Union Electric" service. In addition there are over 20,000 commercial and power customers.

"We tabulate below the growth in total number of patrons beginning with January 1, 1910, up to August 1, 1915:

On January 1, 1910—23,750 customers
On January 1, 1911—28,250 customers
On January 1, 1912—33,750 customers
On January 1, 1913—38,000 customers
On January 1, 1914—46,300 customers
On January 1, 1915—54,500 customers
On August 1, 1915—60,700 customers

"It is reasonable to expect in December, 1915, a total of 65,000 customers will be reached.

"A continued rapid growth will enable the company to make further reductions in its rates from time to time, and thus share its prosperity with its increasing number of patrons, and as the number of our customers increase we now offer the following further reductions in the primary rate:

When our total number of customers reaches 65,000 reduction to 9 cents per kilowatt-hour.
When our total number of customers reaches 70,000 reduction to 8.5 cents per kilowatt-hour.
When our total number of customers reaches 75,000 reduction to 8 cents per kilowatt-hour.

"It is difficult to forecast too far ahead with any degree of certainty, with the rapid advance in the art and improvements and efficiencies that are being constantly developed, to what extent even further reductions may prevail; large additional capital investment is continuously required to maintain a public utility such as the Union Electric, which must keep abreast of the times to render the best of service at the lowest possible rates.

"Many people are still using the older methods of lighting—some coal oil—these are obsolete and out of date. With the present high efficiency incandescent Mazda lamps, with free renewals, the low rates and monthly minimum of 30 cents, and no deposit required, electricity offers to the householder an economical luxury with the comfort and convenience which no other domestic service can bring.

"If your house is not wired we wire 'already built houses' at a low cost, and will divide the payments monthly with your electric light bill."

Electric Pump Wagons for Central Station.

The Boston Edison Company has in service two pump wagons for removing water from manholes in the underground distribution district of Boston. Each of these apparatus consists of a General Vehicle 2,000-pound wagon, with motored rotary pump installed in the panel body, both motor and wagon being driven from a 60-cell A6 Edison battery.

The practice is to make regular trips of inspection, as well as to perform emergency service required after periods of heavy rain. The pumping machinery performs work formerly done by hand pails, and has a capacity of 90 gallons a minute, whereas two men with pails could scarcely remove five gallons of water a minute.

The vehicles average about 20 miles of daily travel, in eight hours, cleaning out 15 to 20 manholes. During a year the crews of the two pumping wagons open about 15,000 manholes, 75 per cent of which require pumping out. The amount of water removed during 10 months of 1914 was 3,130,000 gallons. In one day one of the wagons removed 10,080 gallons from 13 manholes, the pump motor using 58 ampere-hours from the battery. The distance traversed was 16.6 miles and the total battery discharge was 164 ampere-hours, 106 ampere-hours being used for driving the vehicle. The average consumption of the vehicle motor is 4.7 ampere-hours per mile and for both pump and vehicle 5.7 ampere-hours per mile.

A typical daily record showed 13 manholes pumped out and 8 manholes inspected and tested. The 16.6 miles run consumed 2 hours 26 minutes, the pumping time was 1 hour 52 minutes, and lunch and delays consumed 4 hours 13 minutes.

Consumer Liable for Prepayment-Meter Funds.

The Supreme Court of Alabama has recently handed down an interesting decision covering the theft of money from a prepayment gas meter in the case of a consumer of the Birmingham Railway, Light & Power Company, the funds having been taken from the consumer's meter by a person other than an agent of the company. Through successive court actions and appeals the case reached the Supreme Court, which tribunal in its decision upholds the ruling of the Appellate Court, stating as follows:

We are aware of no rule of law which would render invalid and unenforceable an undertaking of a consumer of gas, supplied by prepayment-meter plan, to be responsible for the loss or theft of the money deposited in payment of it, while that money is in the agreed receptacle for it on his premises. By such an undertaking he merely insures the safety from violence or theft of the money deposited for gas as desired before it gets into the possession or under the control of the party entitled to it and while it is in the agreed place of deposit on the premises served through the meter of which the consumer makes use. The law does not forbid the assumption of such risk by the consumer of gas who contracts for such a method of service.

Electric Cooking in Western Canada.

It has been claimed that the city of Winnipeg, Canada, has more electric ranges in use than any other city of the world of the same size. There are in Winnipeg about three thousand stoves of all sizes, and there are eight apartment blocks containing from 8 to 38 apartments each, which are fully equipped with electric ranges.

Fort William has over four hundred ranges installed, Saskatoon two hundred and Edmonton one hundred. In the latter city there is also a bakery which uses electric heat. Calgary and Selkirk have each about fifty ranges, and the smaller towns in proportion.

The results which have been obtained

in the introduction of electric cooking in these cities has been largely due to demonstrations which have been generally carried on. Winnipeg has been especially active in this connection, and the exhibits at the annual Industrial expositions have had widespread results. The actual cooking and baking done by competent demonstrators upon such occasions has given the public a better idea of the possibilities of electric cooking than can be done verbally and such demonstrations have always been well attended.

One-Wire Farm Line at Clarinda.

The Lee Electric Company, Clarinda, Iowa, is operating a rural one-wire grounded-return line which is giving excellent satisfaction. It is a 2,200-volt line, three miles long and so far no trouble has been experienced from lightning disturbances or from telephone interference with grounded telephone lines, although the power line parallels a telephone line for its entire distance.

Rufus E. Lee, manager of the Clarinda company, refers to the line as follows: "The advantage in the line is that we simply extend one of our primary wires by going through two transformers, our idea being that if the scheme eventually works out we will install one-to-one transformers. In the meantime we simply use an ordinary standard 2,200-volt transformer, connected into the other transformer, grounding one side of the second transformer and then extending one line into the country on 25-foot poles with five-inch tops. When we reach the customer we step down directly to 110 or 220 volts as is desired."

This construction is said to be as inexpensive as the ordinary telephone line. Ground connections are made at the poles rather than on a customer's premises. A three-quarter inch pipe driven 12 feet into the ground is used in each case.

The farmers along this line advanced the money to build with the provision that they would be reimbursed at the rate of 50 per cent of their monthly bill after minimum charge has been deducted. In addition to the regular kilowatt-hour rate the company makes a service charge of 50 cents per month, a minimum charge of $1.00 per month and a meter charge of 25 cents per month. This fixed charge of $1.75 is deducted and 50 per cent of the remaining amount of each monthly bill is paid to each customer until the line is paid for by the company.

Business Men Secure White Way Fund.

In order to provide funds for construction of the "white way" system in the business section of Lexington, Ky., the Board of Commerce has appointed teams which will canvass the business men of the city for contributions to the fund.

SUCCESSFUL COMMERCIAL MANAGERS.

L. R. Wallis.

Recently much interest was created among central-station companies by the announcement of the Edison Electric Illuminating Company, of Boston, that a canvass would be made of its entire territory to determine what, if any, domestic appliances were in use by each of its thousands of customers. This vast undertaking is now nearing completion, and the company is in possession of a fund of useful data that will prove invaluable in securing additional business.

This is just one of the many original ideas which have been carried out by the sales department of the Boston

L. R. Wallis,
Superintendent Sales Department, Edison Electric Illuminating Company of Boston.

company under the management of L. R. Wallis, superintendent of sales. In addition to the high connected load per capita among residence customers the Boston Edison Company has an enviable reputation for its activities in other branches of central-station endeavor. It is one of the most prominent advocates of electric vehicles, and was a pioneer in co-operating financially and in other ways with electric-vehicle interests throughout New England to increase the use of battery vehicle. Recently the company, in conjunction with the manufacturers, inaugurated a battery-exchange system which promises to give great impetus to the electric in Boston.

In power sales work the company is second to none, and as a result of its activities a large percentage of the possible business is already connected, including many of the largest manufacturing establishments in the Boston territory.

Mr. Wallis first became identified with the electrical business in January of 1888, when he joined the staff of the Bernstein Electric Company.

In 1891 he became associated with the Buckeye Electric Company as New England representative of that concern. In 1892 he became connected with the central-station business as manager of the Citizens' Gas & Electric Light Company, of Wakefield, Stoneham and Reading, Mass. In 1894 after selling out the property to the town of Wakefield under municipal ownership—it being the first plant so conveyed in Massachusetts—he constructed the gas property at Laconia, N. H. In 1897 Mr. Wallis became treasurer and manager of the Woburn Light, Heat & Power Company, of Woburn, Stoneham and Winchester, Mass. In 1903 this property was sold to the Edison Electric Illuminating Company, of Boston, and after a few years of retirement from the electric business he became associated with the Edison Electric Illuminating Company of Boston as assistant to the general superintendent. In 1910 he became superintendent of the sales department, which position he now holds.

New Rate Schedule at Sioux City.

The Sioux City (Iowa) Gas & Electric Company has announced a reduction in electricity rates for lighting and power service, effective August 1. The new lighting rates are as follows:

						Per kilowatt-hour
First	50	units	per	month	at	9 cents
Next	50	units	per	month	at	8 cents
Next	100	units	per	month	at	6 cents
Next	300	units	per	month	at	5 cents
Next	1000	units	per	month	at	4 cents
Next	1500	units	per	month	at	3.5 cents
Next	3000	units	per	month	at	3 cents

These rates are net after deduction of one-half cent per kilowatt-hour for prompt payment. The minimum charge is $1.00 per month.

The new power rate schedule is as follows:

						Per kilowatt-hour
First	400	units	per	month	at	5 cents
Next	300	units	per	month	at	4 cents
Next	1300	units	per	month	at	3 cents
Next	1400	units	per	month	at	2.5 cents
Next	3400	units	per	month	at	2 cents

The minimum charge under this schedule is $2.00 per month.

Emergency, or break-down service is supplied at the regular rates, except that a minimum guarantee of $1.00 per month per kilowatt of capacity connected is required.

Co-incident with these reductions in rates the company announces that the present street lamps of 32 candlepower in use in accordance with the terms of a contract made by the city will be replaced by 60-candlepower units without additional charge to the city.

The utility company is at present engaged in rehabilitating its power plant.

Electrical Construction

BUSINESS HINTS FOR DEALER AND CONTRACTOR.

By G. D. Crain, Jr.

Keep Batteries Moving.

One of the troubles connected with the flash-lamp business, which isn't a trouble at all if the dealer uses a little common sense in connection with it, is handling the battery stock so as to keep it efficient. A good many retailers have complained that their customers return the batteries for adjustment because they have not received reasonable service out of them, and in most cases the dealers are inclined to blame it on the customer.

It very often happens, however, that the dealer himself is at fault, because he does not keep his batteries moving. In other words, he should sell his oldest batteries first, so that the possibility of deterioration, which is always going on in dry-cell batteries, will be minimized. Sometimes it is found that a dealer, largely from force of habit, will put his fresh stock of batteries at the front of the shelf, and sell from this, when as a matter of fact he should be putting the new goods at the back, and selling from the front, where the older stock has been placed.

This condition emphasizes the point that the dealer should keep only a small stock of batteries on hand, and should turn over his stock frequently. That is good business policy in any event, but it is especially desirable in connection with batteries, on account of the deterioration to which they are subject. One of the biggest jobbing houses in the Central West, which sells thousands of batteries a year for use in flash lamps, frequently bulletins its salesmen and dealers on this subject, emphasizing the idea that it is far better to have a small stock, and keep it moving, than to put in a big stock and run the risk of having customers bring back worn-out batteries and demand replacement.

Some of the battery manufacturers are now stamping the packages with the dates on which their guarantees expire, and this is hastening sales, by making the dealer use his oldest stock first. At the same time it is making it a good plan for jobbers to have goods delivered by wire and express arrangements, instead of laying in a big stock, delivered in the usual way by freight.

Another angle on the proposition is that since the most profitable part of the flash-lamp business is the replacement of batteries, it is important that the customer be satisfied with his battery service, else he will discontinue using the lamp. If the dealer will take care of this feature there will be no trouble about batteries going dead in short order, except in infrequent cases where a short-circuit has been introduced through some fault of the user.

Testing Electric Fans.

In spite of the fact that a great many dealers are convinced that the only thing which will sell a fan is the lowest price quoted in the market, the service feature is still an important one, and the dealer who is prepared to render service, or, better still, anticipate the requirements of his customers to an extent that makes service after the sale unnecessary, has the edge when it comes to competition.

Every fan which goes out of a store ought to be fully tested before it is delivered. In this way the dealer will be able to locate defects, if there are any, and thus avoid having to go to the trouble and expense of replacements. On the other hand, there are fans and fans, and many of them have individual peculiarities which need attention and study. For instance, some light oscillating fans will not start if tilted at an extreme angle. Where this is the case the customer should be given to understand that the fan must be standing on a level when it is started. Other fans require connection to be broken entirely in changing from one phase to another. If this is not done the fan stops. If the fan is tested before being sent out of the store, excessive noise, possibly due to lack of oil, trouble in the commutator, or whatnot, can be noted, and the fan put in good condition before being delivered.

The dealer who reads this may think that too much work and trouble are involved to justify the effort along the lines of testing for defects, but such a policy will pay in the satisfaction of customers, and in time saved after the fans have been put in service. You can't get away from making good the defects of the goods you sell, no matter how much you may want to do so; that is if you expect to stay in the business.

Automobile Lamp Sales.

Becoming "headquarters" for a certain article is largely the result of using publicity in connection with it.

A dealer in a certain large city has got a lot of business from garages, automobile owners and others connected with the motor-car business, simply because he has taken pains from time to time to advertise the fact that he carries a large and complete assortment of automobile lamps. At times he has put on a special sale of tungstens for autos, pricing them attractively so as to get the interest and attention of owners and others.

This effort has paid in the business which has been created directly, and it has also paid, because it has given the dealer a reputation along that line. Owners are often sent to the store by garage men who do not handle lamps and prefer that the purchase be made directly instead of handling it themselves.

Of course, bulbs for autos do not cost much, and the possible business may be limited, but the point is that any article that is featured is going to be sold, and that the dealer who is live enough to hook himself up with the present and potential demand for electrical specialties is going to be remembered when consumers are in the market for those particular goods.

Meetings of the Salesmen.

A successful electrical concern, which handles merchandise and contracting as well, has regular meetings of its force, the get-together affairs coming at least once a month, and sometimes oftener. Among other things it is the object of the organization to familiarize the force with the new goods that are put in stock. The theory of the head of the business is that if the salesmen are not interested in a line the customer's can't be expected to show any great amount of excitement over it; and, on the other hand, that the salesmen won't be interested unless their interest has been aroused by learning something about it.

Hence at these meetings every article which has been put in stock recently is discussed, and all the various selling points brought out. Discussion of the price, with reference to competition from other lines, is included, and when the subject is dismissed everyone present has a good grasp of the proposition, and is in a position to talk that article

effectively to anyone who may inquire about it. If the salesman of the manufacturer happens to be in town when the meeting is held he is invited to attend, and invariably fills the boys up with technical data about the proposition, as well as material which can be used in sales work.

In addition to discussing goods that are actually in stock the members of the organization bring up articles which have just been put on the market. The head of the house asks their opinion of new goods with a double purpose: first, to learn whether the salesmen have discovered any advance demand for the article, and, second, to give an opportunity to "post" them in advance of its being put in stock. One discussion of that sort early this year resulted in a certain popular-priced fan being put on sale, and the store has done well with it, in spite of weather conditions not being altogether favorable.

Money in Fan Sales?

Local conditions often determine the question of profits in the sale of fans. If there happens to be an aggressive dealer of the sort who puts volume before profits, the chances are that prices will be reduced to a point which will not permit the dealer to get out with a whole skin. On the other hand, if the members of the trade are sensible enough to realize that they have got to have a reasonable margin on which to do business, and that no volume, however large, will make up for lack of profit on individual sales, everybody will have a chance to make a little money, and even the dealer who handles only a few fans during the season will have an opportunity to put a few dollars on the right side of the ledger.

In a certain city, where the dealers know the situation well enough to have realized the folly of price-cutting, they have failed to make money this season for the first time in several years. Up to this year everybody has tried to maintain prices. Somebody apparently had an idea that it was possible to make a "killing" on fans, however, and bought in sufficient quantity to get an "extra special" inside price. Then he went out to sell fans when the season opened, and quoted a price which was, on an average, 20 per cent below the figures of last year. Others had to fall in line, with the result that profits have been a minus quantity. In fact, considering the cost of selling them, the dealers have all lost money on their fan sales, and more than one has been talking of dropping the business hereafter.

The fan trade is growing, and is the biggest electrical proposition on the boards in the summer time. The dealers who are handling them have got to use a little horse sense, however, and keep the prices at a profitable level, remembering that a cut price seldom creates business. The most it can do is to divert it from somebody else, and with everybody cutting the advantage is negatived.

Motors for Organ Bellows.

Among the current electrical construction permits which are appearing in Louisville, Ky., are numbers which note installations of electric motors in churches. Calvary Episcopal Church, Trinity Evangelical Church and others have been named in this connection. The electrification consists of connecting motors to the bellows of the pipe organs. Heretofore in Louisville, as elsewhere, the power for operating these organs, where it was not provided by the janitor, has been water power, the mechanism being connected to the city water system. This meant a great deal of waste, however, and required constant attention in cases when the weather was cold. The motor relieves the caretakers of the need of giving this attention, as to start the pump all that is necessary is for the organist to throw the switch. Two-horsepower, single-phase motors generally are installed by the Louisville contractors and most of the large churches are now equipped in that way.

Louisville Contractors Discuss National Convention.

Frank E. Good, electrical engineer for F. A. Clegg & Company, of Louisville, was speaker at the last regular meeting of the Louisville Electrical Clearing House, held on August 9 at the organization's headquarters in the Kentucky Actuarial Bureau suite. Mr. Good's address was in effect a report to these electrical contractors of the national convention at San Francisco, which he attended as delegate from the Kentucky Association. The greater part of his talk was given over to discussion in detail of the forthcoming changes in the national code. These he went into fully, showing in what particulars the new requirements would affect the local situation.

Leslie G. Ross, who for a number of years has been in charge of the sales and contract department of the Superior Water, Light & Power Company, Superior, Wis., has resigned that position and organized a company to do electrical wiring, repair work, etc., and maintain an electric shop with a full line of lamps, fixtures, motors, wiring supplies, and electric appliances of all kinds. The Superior Water, Light & Power Company will discontinue the wiring and supply business, and its unfinished contracts will be cared for by Mr. Ross. The new store will be located at 1205 Tower Avenue, Superior, Wis.

SOME CHARACTERISTICS OF DIRECT-CURRENT MOTORS.

By Harry N. Gilbert.

The direct-current motors in common use are either shunt, compound or series-wound.

Shunt-wound motors have only one kind of field winding. The field coils have quite a high resistance and are placed directly across the line voltage in parallel with the armature. The amount of current flowing in them, and, therefore, the strength of the field, depends only on the voltage and the resistance of the field coils. The strength of the field, is, therefore, practically constant, and will cause the motor to run at practically constant speed, as explained later.

Shunt-wound motors are used for driving line shafting and such machines as impose a fairly steady load on the motor. They are used in a large percentage of the applications. They should not be used where they are going to be subjected to sudden and frequent changes in load or sudden overloads.

Shunt-wound motors run at practically constant speed, irrespective of the load. They are, however, subject to variations in speed, due to the following causes:

(1) Variations in applied voltage.

(2) Variations in temperature of motor windings.

(3) Variations in amount of load.

(4) Variations in magnetic permeability of iron parts.

Variations in speed due to voltage are dependent upon the supply circuit and the size of the feeders from the generator to the motor. Feeders should be of such size as not to cause excessive line drop when the motor is fully loaded. The speed variation of a shunt motor for slight changes in voltage may be considered proportional to the change in voltage. An increase in voltage raises the speed, a decrease lowers the speed. A reduction in voltage tends to make the armature run slower. On the other hand, the field is weakened by a reduction in voltage, which would cause the armature to run faster. The speed obtained is, therefore, a resultant of these two opposing causes. The percentage of change in speed is in fact slightly less than the change in voltage.

Variations of voltage are beyond the control of the motor manufacturer, and a motor should be ordered to suit the voltage of the circuit to which it is to be applied. If the voltage variations are very great and frequent, as on a street-railway circuit, the motor should be designed with these variations in mind.

Variations in speed due to variations in temperature are caused by physical properties of the materials of which motors are made. The current carrying parts of motors (excepting, of course, the carbon brushes) are usually made of copper or copper alloys. The resistance of copper increases with increase of temperature. The resistance of annealed copper increases, roughly, 0.4 per cent for every degree centigrade rise in temperature above 20 degrees centigrade.

When a motor has been standing idle for about two hours, it has practically the same temperature as the room in which it is located. As the motor is run its temperature rises, until it reaches its working temperature. The speed will also vary as the temperature varies.

Standard practice permits 20 per cent increase of shunt-field resistance, which decreases the ampere-turns producing field flux by 20 per cent. This reduces the magnetic flux from 10 to 15 per cent, tending to increase the armature speed 10 to 15 per cent.

The conductors on the armature and all other conductors in series with it also increase in resistance. This causes a greater drop of voltage in the armature circuit, tending to make the armature run slower.

These two tendencies oppose each other, and the resultant change in the motor speed is determined by their comparative strengths. The slowing down effect of the armature is greater in small machines than in large ones. The same is also true of slow-speed motors, as compared with high-speed motors. This is due to the fact that small motors and slow-speed motors have a comparatively greater resistance than do large motors and high-speed motors. As an average the increase in speed from cold to hot is about 8 to 12 per cent. The speed increase for small and for slow-speed motors will be less; for large and for high-speed motors it will be greater than this. As a motor reaches its maximum temperature in two hours at the most, if run fully loaded, this is usually not objectionable.

Variations in speed, due to variations in load, are caused by the resistance of the armature conductors and the current-carrying parts in series with them. The current flowing through this resistance causes a voltage drop, which in turn causes the motor to slow down. The greater the current the greater the voltage drop, and the consequent reduction in speed. As explained above, small and also slow-speed motors have a comparatively high armature resistance, and will, therefore, have a greater percentage drop in speed from no load to full load. The average change in speed from no load to full load on a shunt motor is from 2 to 5 per cent.

Variation in speed due to magnetic permeability of iron or steel parts is caused by physical properties of those parts. A person not familiar with such matters would naturally assume that two motors made from the same drawings and wound exactly the same, would run at exactly the same speeds. Such, however, is not necessarily the case. If the steel or iron, from which the two motors are made does not possess the same magnetic properties the motors will not run at the same speeds. The motor manufacturer cannot govern this point entirely. He can, and practically all do, buy steel that has fairly uniform magnetic qualities. Steel made at different times, in accordance with the same specifications as to magnetic quality, will not vary enough to make serious differences in speeds of motors built from it.

The points brought out under these four headings might lead one to conclude that the speed of a motor cannot be very closely determined before it is built. This conclusion, however, would not be correct. Motor manufacturers guarantee that their motors will not vary from listed speeds more than 5 per cent in case of motors above one horsepower, and 10 per cent in cases of motors below one horsepower. The commonly accepted basis for speed rating of a motor is full-load speed of motor hot. Practically all motors when first tested at the factory come within the 5 or 10 per cent limit mentioned above. Those which do not come within this limit receive special attention, and are not shipped out, unless customer consents to the speed at which they do run. By making slight alterations in the windings they can easily be brought within these limits.

In case of a belted motor, belt speed is the important thing rather than armature speed. Motors which come outside these 5 or 10 per cent limits can often be made suitable by furnishing a special pulley. Where a customer has a large number of motors installed and keeps spare motors to replace damaged ones, furnishing a special pulley is sometimes objectionable. It is not done, therefore, without customer's consent.

Compound-wound motors have two field windings. One is the same as the winding of the shunt motor, and the other winding (the series winding) is in series with the armature. Its strength, therefore, depends upon the amount of current flowing through the armature, which in turn depends on the load. The total field strength, therefore, increases and decreases with increase and decrease of load. The proportion of the field strength furnished by the series winding can be as is desired to suit the load it is to drive. The ordinary standard compound motor is designed to furnish about 25 per cent of the field strength at full load. This can be made more or less to meet the requirements of the service.

Compound-wound motors are used where the starting load is very heavy, or where the load changes frequently, suddenly and violently, as in reciprocating pumps, rock crushers, punch presses, elevators, etc.

The four causes of speed variation discussed under shunt motors also affect compound motors in a similar manner. The speed of a compound motor varies much more with changes of load than does the speed of the shunt motor. The greater the proportion of the field strength furnished by the series field the greater will be the variation of speed from no load to full load. The motor, of course, runs faster at no load than at full load; it does not run away, however, at no load as does the series motor.

The series winding may carry all or only a certain percentage of the current entering the armature. The field strength, therefore, varies with the load; the heavier the load the stronger the field. A sudden increase of load causes more current to enter the armature. As this current, or a fixed percentage of it, goes through the series field it increases the field strength. The ability of the motor to produce torque or pull, other things being the same, depends on the field strength; the greater the field strength, the greater the pull. A compound motor, therefore, automatically takes care of sudden load changes.

Series-wound motors have only one field winding. It is in series with the armature and carries all or a fixed percentage of the current flowing through the armature. The strength of the field depends directly upon the load on the motor. A series motor gives a very heavy starting torque at a slow speed. As the driven machine starts up and requires less torque the motor speeds up automatically.

Series motors should be so arranged that they cannot lose their load, as their speed depends on the amount of load they carry. At no load they run at an excessively high speed, and may throw out the armature windings or segments in the commutator. For this reason they are usually geared or coupled directly to the machine being driven and seldom belted.

Series motors are used where the load is practically constant or where variation in speed with changes of load does not matter. They are used on centrifugal pumps, fans, certain kinds of hoists, street cars, etc. They are gen-

erally used in connection with a hand-operated speed regulator.

Series motors are subject to the same four causes of speed variation mentioned under shunt motors, but in some cases differently.

The speed of a series motor (keeping the same torque and current) varies slightly faster than the voltage, because both field windings and armature windings act to produce a change in the same direction, instead of in opposite directions, as in the case of a shunt motor.

The speed of a series motor is less hot than cold, which is just the opposite to a shunt motor. This is due to the fact that the armature and series field increase in resistance when heated up, thus giving a greater voltage drop in the motor, which makes it run slower.

The variations in the magnetic properties of the iron or steel have the same effect on the speed of series motors as on shunt and compound motors.

Shunt, compound and series motors can all be equipped with commutating poles. They are poles midway between the main poles of the motor. Their windings are in series with the armature and carry all or a fixed percentage of the current flowing through the armature. Their principal duty is to prevent sparking at the brushes and short-circuit currents in the armature coils when they are under commutation. Since these short-circuit currents pass through the brush as it spans the two commutator segments attached to the two ends of the coils, commutating poles, when properly designed, make the brushes and commutator run much cooler; or what is the same, permit of more load current being carried on the same size of brushes and commutator.

The speed of any motor having a shunt field can be increased by inserting resistance in series with the field winding. This cuts down the current flowing through the field winding, decreases the field strength, and, therefore, increases the speed of the armature. If this is done with the ordinary shunt motor without commutating poles, it will begin to spark at the brushes and give trouble before the speed has been increased very much. By using properly proportioned commutating poles and getting the proper relation between the ampere-turns on the commutating poles and the ampere-turns on the armature, the speed may be increased four to five times the normal without the faintest sign of sparking at the brushes. Commutating poles also make the speed of a motor more stable with variations in load.

The speed of a series motor can be varied by shunting part of the current around the series winding, thus weakening the field strength. This is used in some street-railway control systems. Commutating poles are necessary here for the same reasons they are necessary in shunt motors.

Great care must be taken to get the brushes in the proper position on the commutator when commutating poles are used, especially on motors with a wide speed range. If the brushes are not in the proper position the motor is liable to surge badly or the armature may run away. By surging is meant rapid periodic increase and decrease of the speed. The brushes of commutating-pole motors are very carefully set at the factories, and many companies lock them in position with a screw. They should never be moved except by some one who thoroughly understands setting brushes on commutating-pole machines.

The above are the more important characteristics of direct-current motors. They should be thoroughly understood by salesmen selling direct-current motors. The person using numbers of direct-current motors or having to take care of them, should also understand these characteristics. There are a good many other characteristics not mentioned here, that are of interest to designers and manufacturers only. The ones discussed have only been treated in a superficial manner without going into the technical explanation of all points. The aim was to make things plain to the ordinary user of motors.

Among the Contractors.

Amos L. Utz, formerly a member of the firm known as the Standard Electric Company, of St. Joseph, Mo., has sold his interest to other members of the firm, and has started in business alone at 918 Francis Street, St. Joseph, under the name of The Electric Shop. He will do a general construction business, carry a full line of fixtures and appliances and will also handle and repair motors. Mr. Utz is well and favorably known in St. Joseph.

J. F. Buchanan & Company, Philadelphia, Pa., has been awarded the contract for electrical work for the new Princeton (N. J.) University Dining Halls, which are estimated to cost $475,000.

The Carr & Schultz Electric Company, Trenton, N. J., has been awarded a contract for the electrical work in the new Cadwalader Heights Church, Trenton.

The Home Electric Company has been awarded the contract for installing the lighting fixtures and wiring the new Bernheim Building on Fourth Street, in Louisville, Ky.

The Standard Electric Company, Minneapolis, Minn., has begun the electrical wiring of the new residence of E. S. Woodworth, at 2222 Stevens Avenue. This residence will be fully equipped with all modern electrical conveniences and will have underground service through the garage.

This company has closed the contract for the electrical wiring of the Epworth Methodist Episcopal Church and is also engaged in the wiring of the R. E. Hawkins residence at 128 Clifton Avenue, and additional wiring in the Woman's Club of Minneapolis Building.

The county commissioners have let to Grimes and Thompson, of Piqua, O., the contract for the addition to the courthouse heating and lighting plant at Troy.

The contract for the wiring of the new Rockwell and Riverview school buildings in Havana, Ill., has been awarded to the Commercial Electric Company, of that city.

The Electric Construction and Machinery Company, of Rock Island, Ill., is about to begin building a high-tension line from Dubuque, Iowa, to Dyersville, Iowa, a distance of 28 miles, and taking in the towns of Epworth, Farley and Peosta. Cedar or steel poles will be used.

The Dubuque Electric Company, of Dubuque, Iowa, has secured the contract for the complete electrification of St. Clair College, Sinsinawa, Wis. 2,400 lights will be provided for and quite a number of motors will be used.

The J. W. Turner Improvement Company, of Des Moines, Iowa, has secured a contract, covering conduit extensions, to the Des Moines Electric Company's underground system. The Turner company has just completed a very fine underground installation in South Bend, Ind.

A. Engelhardt, 211 South Crystal Street, East Stroudsburg, Pa., has a contract for installing the electric light and power system in a $40,000 addition to the East Stroudsburg High School. He also has a contract for wiring for electric lights and telephones in addition to the Wallace Building in Stroudsburg, which is to be occupied by one of the Woolworth chain of stores. In addition to the above he has contracts for installing house-lighting plants in several summer homes in Pike and Monroe Counties.

The Maxwell Electric Company, a new firm of electrical contractors in Steubenville, O., has opened a shop at 121 North Fifth Street under the management of R. B. Maxwell, who was formerly with the Steuben Electric Company.

Public Service Commissions

Conducted by William J. Norton

CALIFORNIA.

The Los Angeles Gas and Electric Corporation has filed an application with the Railroad Commission for permission to increase rates for gas, holding that its present charge, as fixed by the City Council of Los Angeles is not remunerative. This case is taken before the Commission in accordance with the re-enacted Public Utilities Act, which enlarged the jurisdiction of the Commission, to include, after August 7, 1915, all privately owned public utilities within municipalities in the state.

DISTRICT OF COLUMBIA.

Stock and Bond Issues. In the last annual report of the Public Utilities Commission of the District of Columbia, the Commission took the position that, until the completion of the valuations of the property of public utilities, additional capitalization should be confined to the least amount possible without embarrassing the utilities in the proper performance of their functions.

The Commission has annuonced that it will not reconsider its decision to defer action on the request of the Potomac Electric Power Company for its approval of a bond issue of $415,000 until the completion of the valuation and investigation of the company's properties.

Notice was recently served on the Commission by the company that unless the bond issue was approved appeal would be made to the courts. Similar action was taken recently by the Washington Railway and Electric Company following the refusal of the Commission to approve a bond issue of $341,000.

GEORGIA.

Protection from Competition. It is alleged that private interests are seeking to provide competition to undermine the value of the Western and Atlantic Railroad, the state road, and an act has been passed by the state legislature and approved by the Governor prohibiting the issuance of a charter to any corporation which *would parallel the state road.*

INDIANA.

The Merchants Heat and Light Company has applied for permission to put in effect an "active-room" method of charging. The company, in its application, states that the socket method of charging, used in the schedule for residence lighting fixed by the Commission in its recent decision, is complicated and hard for the customer to understand, and that it discourages the use of lights and electrical conveniences. The proposed rate provides that all current used up to and including three kilowatt-hours an active room per month shall be charged at the rate of seven cents a kilowatt-hour and all current used over this amount shall be charged for at the rate of five cents a kilowatt-hour. The company does not ask that the socket rate be abandoned, but asks that the "active-room" method be approved as an additional plan for determining the rates.

The Commission has set September 2 as the date for the hearing on this request.

NEW JERSEY.

The New York Telephone Company has submitted to the Commission new message-rate schedules, effective September 1, in a number of municipalities in northern New Jersey.

The schedules are submitted with the aim of harmonizing, as far as differences in conditions will admit, the schedules in northern New Jersey with those in effect in New York City. The new schedules involve material decreases and the engineer of the utilities commission has recommended that they be substituted for the present schedules.

It is estimated that these reductions, together with the changes in interstate toll rates between Bayonne and New York City, filed on July 1 last, will make a saving to subscribers of $100,000 per year.

NEW YORK—Second District.

New York Telephone Company. The Commission has decided the case of the Board of Supervisors of Orleans County and the Trustees of the Village of Albion against the New York Telephone Company. In 1911 the company increased its rate for two-party business lines from $24 to $30 per annum and for four-party residence service from $12 to $15 per annum. The petitioners asked for an investigation to determine the reasonableness of the increases.

Complete inventories and valuation data were filed by the company and checked by the engineers, and the decision of the Commission discusses at length the facts and figures submitted as evidence.

The Commission finds that if proper amounts were set aside to cover the various items of expense, including depreciation, the company, even under the increased rates, not only failed to earn a reasonable return on its investment in the Albion local area, but was actually incurring a deficit. It was further pointed out that the bulk of the company's business was over the two-party business and four-party residence and rural lines, so that only by increases in these rates could the company hope to increase its revenue. The increases are approved by the Commission.

The Long Island Lighting Company was authorized to take over the Babylon Electric Light Company. The Long Island company is permitted to issue $175,000 of its 5% 25-year first-mortgage gold bonds at not less than 87.5 to net $153,125, and $125,000 capital stock at par. The proceeds of these issues amounting to $278,125 is to be used to acquire all the property, rights and assets, including franchises, and subject to liabilities of the Babylon company. The Babylon company will thereupon dissolve and cancel its outstahding stock of $75,000.

INTERSTATE COMMERCE COMMISSION.

The 1915 Western Rate-Advance Case, which has been before the Commission for some time, was decided July 30. Instead of advancing rates generally by a uniform percentage, as was done in the Five Per Cent case, the roads in the present case selected particular commodities and proposed specified increases in the rates thereon, basing their claims for additional revenue on the downward tendency of net earnings and the contention that the commodities involved do not bear their fair share of costs of transportation. The increases were granted in some cases and refused in others, the advanced rates approved representing a comparatively small portion of the amount sought.

The Commission voted five to two,

Commissioners Daniels and Harlan dissenting from the majority opinion. Commissioner Daniels, in his dissent, declares that the "carriers have in general sustained the burden of proof cast upon them by the statute, and are of right entitled to increases in rates productive of revenue far in excess of what they are accorded in this decision," and he held that "just and reasonable increased rates should be permitted not grudgingly, but with such fair measure of allowance as will indicate that the transportation industry is entitled, in the interest of the public, to earnings sufficient to provide a service commensurate with public needs."

Commissioner Harlan's dissent was brief, merely holding that, aside from the financial condition of the railroads, he was convinced that the increases they asked were just and reasonable.

SUPREME COURT.

Des Moines Gas Company Case. In an opinion written by Justice Day, the United States Supreme Court has dismissed the appeal taken from the ordinance of the city of Des Moines fixing the rates of the Des Moines Gas Company. The suit was begun in the District Court of the United States for the Southern District of Iowa by the appellant company to enjoin the enforcement of the provisions of a certain ordinance of the city of Des Moines fixing the rate to be charged for gas at 90 cents per thousand cubic feet, the rate to be effective from January 1, 1911. A temporary injunction was granted and the case was referred to a special master in chancery to report on findings of fact and conclusions of law. The District Court confirmed the report of the master and dismissed the appeal "with prejudice," and added: "At any time on and after three years from this date complainant, its successor or assigns may, on motion, reinstate this case with all the pleadings and evidence now on file, with the same and like effect as though filed for such subsequent hearing. And each party may then file such additional pleadings and take and file such additional evidence as to each party may be deemed advisable."

The Supreme Court says: "While we agree with the court below that it was right to confirm the master's report and dismiss the bill, we think, in view of the fact that the attack upon the rates was made before the ordinance went into effect, and before actual application of the rates could demonstrate whether they were remunerative or not, that the court should have followed the recommendation of the master and dismissed the bill without prejudice. We think this is particularly so, in view of the fact that ordinarily time alone can satisfactorily demonstrate in a case like this whether or not the rates established will prove so unremunerative as to be confiscatory in the sense in which that term has been defined in rate-making cases." The decree of the lower court is affirmed with the modification that the case be dismissed "without prejudice." The particular exceptions to the master's report which were brought before the Supreme Court concerned the manner of dealing with going value and the cost of paving over mains. In the master's report the property was valued on the basis of reproduction cost new, less depreciation. The cost of reproduction of paving over mains estimated at $140,000 and going value estimated at $300,000 were not included in the final figure. If these items were included the valuation of the plant would be such that a fair return could not be made under the rates fixed by the ordinance and the company would be entitled to a decree in its favor. Therefore, the action of the Supreme Court in passing upon the decree of the lower court depended upon the consideration of these two points.

Paving Over Mains.—In regard to the estimate of the cost of reproducing paving over mains where such cost had not been borne by the company, the Supreme Court says: "As to the item of $140,000 which, it is contended, should be added to the valuation because of the fact that the master valued the property on the basis of the cost of reproduction new, less depreciation, and it would be necessary in such reproduction to take up and replace pavements on streets which were unpaved when the gas mains were laid, in order to replace the mains, we are of opinion that the court below correctly disposed of this question. These pavements were already in place. It may be conceded that they would require removal at the time when it became necessary to reproduce the plant in this respect. The master reached the conclusion that the life of the mains would not be enhanced by the necessity of removing the pavements, and that the company had no right of property in the pavements thus dealt with, and that there was neither justice nor equity in requiring the people who had been at the expense of paving the streets to pay an additional sum for gas because the plant, when put in, would have to be at the expense of taking up and replacing the pavements in building the same. He held that such added value was wholly theoretical, when no benefit was derived therefrom. We find no error in this disposition of the question."

Going Value.—The court reviews the findings regarding going value in the master's report. It appears that he was at first disposed to allow $300,000 for going value, stating that in his judgment the plant "is worth that much more than a plant would be that had to develop its business."

"I think a purchaser would be willing to add this amount for its developed business, and that a seller would not be willing to sell unless he got that much more than its physical value, but I could not give the mental process by which this conclusion is reached any more than a jury could do so, under like circumstances, but it is nevertheless my judgment under all the evidence in the case." The master says that the element of good will is not to be included in the going value of a public utility.

"But there is a great difference even in a monopoly which has a business already developed and one that must develop it. The plant of complainant has all its parts working in harmony, performing their several functions in producing and conveying the gas to its customers. These several parts are not only in place, but have been brought to a harmonious operation throughout. Even the employees of the concern are familiar with their duties and experienced in performing them. But without business no matter how perfect it may be, it would be unprofitable. It is ready, however, for business and has the business to transact. It was a small concern at the start in 1864, but its books show that it has had a steady growth for many years in the past, and everything indicates that it will continue in the future. There is great difference between such a plant and one whose business must be developed. All a purchaser of such a plant would have to do would be to take charge of the plant, 'touch the button,' and he is making money from the start. There is no element of uncertainty connected with it. He can retain its experienced employees as a rule, should he so desire, at the same wages. There is no question that such a plant has a 'going value' because it is a money maker from the start.

"The only difficulty is to determine how much its 'going value' is worth. No interest during its construction is allowed, nor anything that is included in the 'overhead charges,' which are part of the physical value. But simply the fact that it has a developed business that will make money for its owner, with reasonable rates allowed for the product which it manufactures and sells."

The Supreme Court says: "That 'good will,' in the sense in which that term is generally used as indicating

that element of value which inheres in the fixed and favorable consideration of customers, arising from an established and well known and well conducted business, has no place in the fixing of valuation for the purpose of rate-making of public service corporations of this character, was established in Willcox v. Consolidated Gas Company, 212 U. S. 19, 52." . . .

"That there is an element of value in an assembled and established plant, doing business and earning money, over one not thus advanced, is self-evident. This element of value is a property right, and should be considered in determining the value of the property, upon which the owner has a right to make a fair return when the same is privately owned although dedicated to public use. Each case must be controlled by its own circumstances, and the actual question here is: In view of the facts found, and the method of valuation used by him, did the master sufficiently include this element in determining the value of the property of this company for rate-making purposes?

"Included in going value as usually reckoned is the investment necessary to organizing and establishing the business which is not embraced in the value of its actual physical property. In this case, what may be called the inception cost of the enterprise entering into the establishing of a going concern had long since been incurred. The present company and its predecessors had long carried on business in the City of Des Moines, under other ordinances, and at higher rates than the ordinance in question established. For aught that appears in this record, these expenses may have been already compensated in rates charged and collected under former ordinances. As we have said, every presumption is in favor of the legitimate exercise of the rate-making power, and it is not to be presumed, without proof, that a company is under the necessity of making up losses and expenditures incidental to the experimental stage of its business."

Discussion of going value by the court in Knoxville v. Knoxville Water Company (212 U. S. 1), Cedar Rapids Gaslight Company v. Cedar Rapids (223 U. S. 655), Cedar Rapids Water Company v. Cedar Rapids (118 Iowa 234), and Willcox v. Consolidated Gas Company (212 U. S. 19), are reviewed, and the court concludes that "As pointed out in the Cedar Rapids case, if return is to be regarded beyond that compensation which a public service corporation is entitled to earn upon the fair value of its property, the right to regulate is of no moment, and income to which the corporation is not entitled would become the basis of valuation in determining the rights of the public. When, as here, a long established and successful plant of this character is valued for rate-making purposes, and the value of the property fixed as the master certifies upon the basis of a plant in successful operation, and overhead charges have been allowed for the items and in the sums already stated, it cannot be said, in view of the facts in this case, that the element of going value has not been given the consideration it deserves and the appellant's contention in this behalf is not sustained."

Rate of Return.—The master found that on the value of the plant in actual and successful operation the rates would yield a return of, at least, six per cent. The Supreme Court says:

"Nor do we think there was error in refusing an injunction upon the conclusion reached that a return of six per cent per annum on the valuation would not be confiscatory. This is especially true in view of the fact that the ordinance was attacked before there was opportunity to test its results by actual experience. It is true the master reported that in his opinion the company ought to earn eight per cent, but he also found that in his judgment gas could be producer for 60 cents per thousand, and the actual effect of the 90-cent rate on an economically managed plant had not had the test of experience."

Arkansas Coal in 1914.

The Geological Survey reports a production of 1,836,540 tons of coal in Arkansas for 1914, with a value at the mines conservatively estimated at $3,158,000.

Lighting of the Widener Memorial Library.

The Harry Elkins Widener Memorial Library at Harvard University, which was dedicated in June, was built as a memorial to that member of the Class of 1907, who was lost in the Titanic disaster. It cost about $2,500,000 and is by far the finest building of the University.

The type and arrangement of lighting fixtures were the result of careful study on the part of the architect, in consultation with experts of the Lord Electric Company's New York office. The result is a highly ornamental and artistic arrangement, with abundant illumination where it is required, for reading and study. The ornamental lighting fixtures were furnished and installed by the Sterling Bronze Company, New York, and the ceiling lighting in the main reading hall and the lighting of the 10-story stockroom were installed by the Lord Electric Company, Boston. The fixtures are all of special design.

Main Reading Hall, Widener Library.

A high porch formed by the massive columns at the main entrance is lighted by eleven 100-watt Mazda lamps installed in opal balls at the ceiling. The entrance lobby has three bronze lanterns of severely plain design, each containing six 60-watt Mazda units, and the main entrance hall is lighted by 18 white alabaster ceiling bowls, one in the center of each bay formed by two lines of white marble columns. Each bowl contains three 60-watt Mazdas.

Ground-floor corridors leading from this hall are finished in handsome marbles and are lighted in each groin

by buff alabaster ceiling bowls each containing three 60-watt tungsten units. The buff bowls impart a golden glow to the corridor interiors, which is very effective.

Over the main staircase, and also in the main hall at the head of the stairs, is installed a handsome 24-light bronze chandelier weighing 600 pounds and carrying candle lamps consisting of an Edison socket with enameled-metal "candle" surmounted by a 60-watt tungsten round frosted lamp. In the memorial hall beyond is another bronze chandelier weighing about 900 pounds, equipped with 24 lamps of the same pattern. Each of the chandeliers is suspended on a heavy bronze chain.

The main reading hall is about 50 by 150 feet, and contains 22 oak study tables, each of which carries two solid bronze table lamps 30 inches high, containing three 40-watt Mazda units closely shielded in a cylindrical shade. The wires connecting the lamps are

Bronze Lanterns in Lobby.

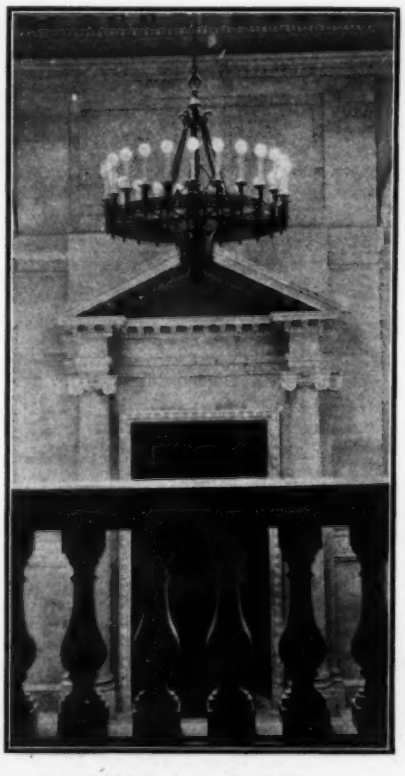
carried through junction boxes beneath the table surface, connected through one-half-inch galvanized-iron conduit which runs to a junction at one end of the table, whence a section of one-half-inch brass conduit connects with a screw plate set in the floor at the base of the table support. The galvanized conduit is secured between the table frame and the under side of the top, and the lamp standard is secured by an insulated locknut and a brass nut which is manipulated through the junction box below. The librarian's desks are similarly equipped.

Above the cornice of the main hall are installed I. P. Frink cove reflectors with 600 40-watt clear Mazda lamps, the light being reflected upwards on the white round-arched ceiling. This installation is continuous in the cornice along the four walls of the hall.

Corridor Lighting.

The same system of table lighting as that employed in the main reading hall is common to the reference room and the special reading room, at either end of the main hall, and to the periodical room adjoining.

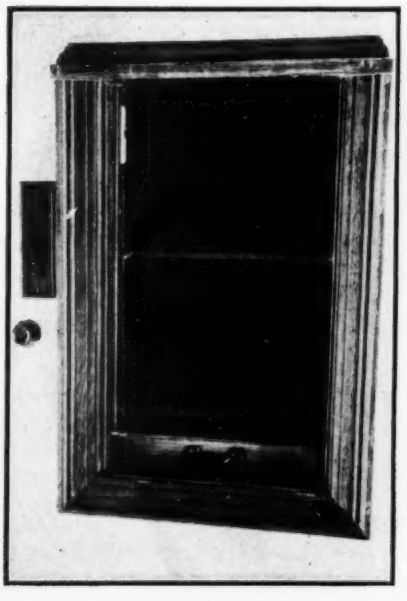
The lighting of the open bookcases which line the walls of these rooms is provided by O'Brien bronze reflectors, containing 40-watt Rayline tube lamps, set at about 45 degrees from perpendicular, about 10 inches in front of the face of the cases. The reflectors are adjustable on their supporting brackets by means of thumb screws and are set for a six-foot range of lighting over the whole surface of the several shelves of books reaching to within 10 inches of the floor. The tube lights are almost continuous, there being a space of only three inches between the units. The lamps are controlled by double push-buttons on flexible cords, the buttons being painted red and black, to denote lighted and extinguished.



One of the Bronze Chandeliers.

In each of the special reading rooms there are five 8-light bronze chandeliers with 60-watt bowl-frosted Mazda lamps. The chandeliers are suspended by chains about 10 feet below the ceiling and 12 feet above the floor, and provide abundant general lighting for the rooms.

In the study rooms on the third floor, 100-watt and 60-watt Mazda



Book Elevator.

bowl-frosted lamps in Doric shades are installed close to the ceiling, providing abundant general lighting for the whole room, which is about 10 feet high. The units are spaced on 10 and 12-foot centers. Over the corridors and lesser staircases are nine-inch opal balls containing two 60-watt units, installed at the ceiling.

The lighting of the stack rooms represents the most advanced practice. On either end of every alternate stack are two three-way switches in a single panel, controlling the lights in the aisles on either side. The units are 25-watt clear-glass Mazdas. The arrangement allows the attendant to switch on the required lights and extinguish them from either switch after the desired book has been found.

The wires for the stack-room lights are carried up the hollow metal stack

frame to the switch box, and thence in the frame to the top of the stack, where a junction box is located which is connected to conduit leading through holes drilled in the steel floor beams.

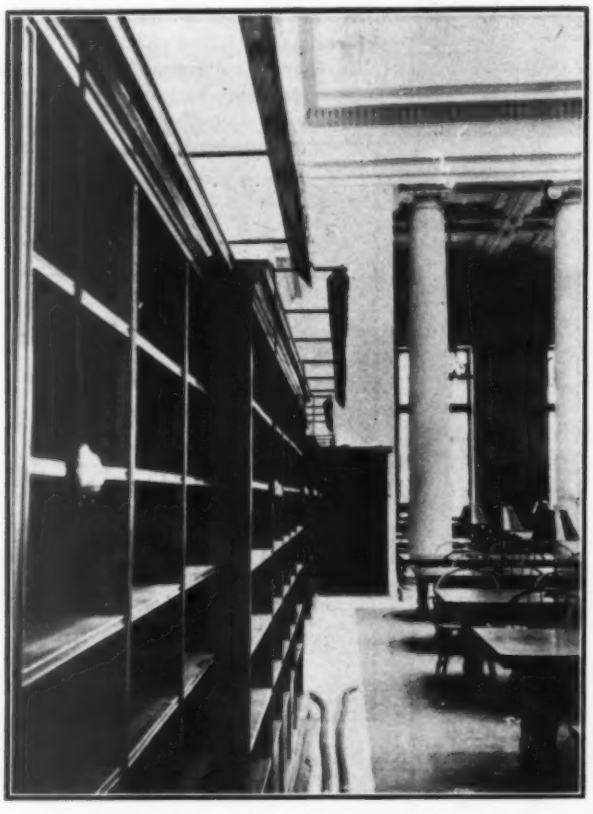
On the ground floor of the library is located the Government History Room, which is lighted by means of 15 five-light bronze chandeliers each carrying 40-watt Mazda bowl-frosted units in handsome etched alabaster shades. There are bronze table lamps of the same pattern as those in the reading rooms above. Store rooms for books, adjacent to the history room, are provided with 25-watt Mazda lamps installed in a manner similar to those in the stack room and controlled from double-switch panels at one end of each alternate stack, nearest the entrance to the room.

For the control of lights on the main floor, three lighting cabinets are installed in a closet leading off the main reading room. These consist of gray marble panels and steel-lined oak doors and frame, and contain switches and fuses for 74 circuits connecting lamps in the reading rooms and reference rooms. Cabinets of similar design control lighting circuits of the other floors.

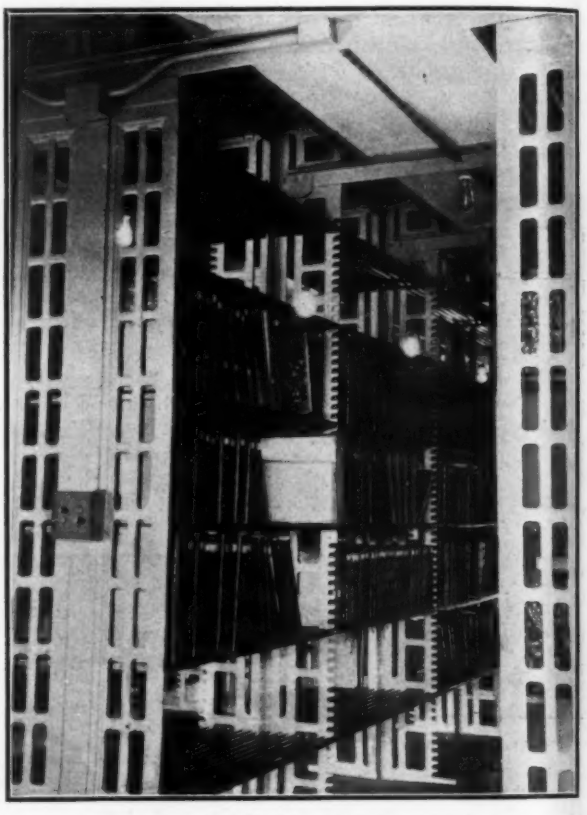
The library contains six electrically operated passenger elevators of F. S. Payne Company manufacture. One, of 2,500 pounds capacity, is for the use of the public, with an operator in attendance. The others are automatic elevators, of 1,800 and 1,200 pounds capacity. They are designed to carry trucks containing books, as well as the attendants. In addition, two Payne book elevators, each with two shelves, are installed, for automatic operation between the several floors by selective push-button control.

Energy for the library light and power supply is from the Cambridge Electric Light Company and is furnished to a transformer vault at the north end of the building, where the ultimate equipment will be of between 100 and 150 kilowatts capacity for lighting, and about the same amount for power. Motors to be installed for the ventilating-heating and vacuum-cleaner systems, in addition to those in service on elevators, will bring the aggregate to about 250 horsepower. Energy enters from the central station's ducts at 2,300 volts, and is utilized for power at 550 volts, three-phase, 60 cycles, and for lighting on a 220/110-volt three-wire system. Throughout the library the conduit is embedded in floors, walls and ceilings, which are of reinforced concrete faced with marbles or frescoes.

Henry Lutz, of New York, was in charge of the installation for the Sterling Bronze Company. The architect was Horace Trumbauer, of Philadelphia.



Tube Lighting of Book Cases in Reading Room.



Installation in Stock Room of Widener Library.

Unusual Lighting Effects at Night Pageant.

The first use of the newly developed General Electric incandescent searchlight and floodlighting projector for the illumination of outdoor performances was in connection with the pageant at Lexington, Mass., June 21, 22, and 23. This was one of the most ambitious historical presentations ever attempted, the performers, numbering about 1,000, being in charge of Lionel Belmore, of the Vitagraph Company of America.

The grounds selected consisted of a central level field with sloping turf hill for audience seats, a hill opposite for spectacular groupings, and a grove and a pond at the right of the stage, the latter for water events. The Lexington "belfry," church and antique houses were reproduced in wood and papier mache, in natural size. The front of the "stage" was 180 feet wide.

The "curtain" was of novel construction, being a wall of steam emitted from perforations in lengths of 2-inch pipe supplied from a dismantled locomotive boiler. Just back of the curtain were the footlights, which consisted of three lines of colored incandescent lamps—blue, pink and amber dipped, installed on a 10-inch board laid upon cleated supports erected in the trench containing the steam pipes. There were four circuits comprising 800 25-watt units. The lamps were

controlled by a Cutler-Hammer dimmer, each plate handling 25 amperes.

At the back of the grandstand was erected a lighting bridge from which the pageant lighting was directed. Here were installed, on a covered platform about 10 feet above the floor of the grandstand, eight 20-inch incandescent searchlights, each containing a 750-watt, 1,500-candlepower focusing type C Mazda headlight lamp. Each of these lamps develops a beam candlepower approximating 1,000,000. The units were arranged on two shelves with four searchlights each, and were grouped at such angles that the light would be diffused as widely as possible, and operate in conjunction with ten groups of Form L-1 floodlighting projectors mounted in various parts of the field, in groups of two to 10 units each. The plan achieved was to produce a general flood-light effect on the scenes, preserving shadow values but not producing spotlight effects. This called for coördinated operation of the several groups of projectors in varying combinations as the subjects demanded.

To better produce sunlight and evening effects, a gelatine color medium was provided in front of each group of lights. These consisted of a framework about 8 by 4 feet, one-third of the surface consisting of blue, the next of blue and amber in triangular sections, and the last of amber gelatine sheets, the frame being supported in such a manner as to be drawn back and forward by hand as ordered by the lighting director, and at a speed as directed by that official from his station on the lighting bridge. The color frames for the searchlights on the bridge were raised or lowered on hinges.

A field switch-house was located at the left end of the steam curtain. Here were installed the dimmers for both the footlights and the floodlights, the apparatus for the latter being a 100-ampere Cutler-Hammer unit. To keep the switch-house ventilated and comfortable for the operators, a 16-inch ventilating fan was installed in the open window.

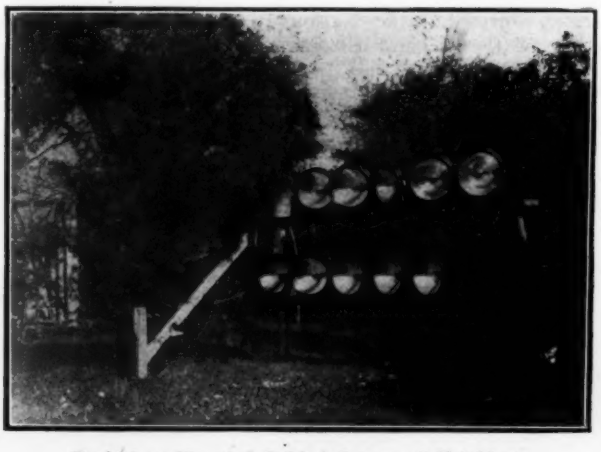
The stage director's position was on the left of the field. His directions were issued to the lighting director, and by him to the floodlight operators, through a linemen's telephone set with 20 stations, furnished by courtesy of the New England Telephone & Telegraph Company. All instruments being in circuit at once, all the operators were constantly kept posted as to the next move.

The projector groups were installed in various positions about the field. Each group was arranged on a shelf about five feet from the ground and screened by shrubbery or pine boughs set in the earth. Each of these units contained a 500-watt type C Mazda lamp developing 404,000 candlepower at the beam. By means of the focussing device, the beam can be spread from 6 to 18 degrees. For far distances the narrow spread was used, and for nearer distances the wider spread. A maximum lighting of 1,000 feet distance was effected, this being a tree at the far end of the pond referred to. The water scenes were illuminated by three projector groups, one on either side and one at the near end of the pond, the units numbering 10 in all.

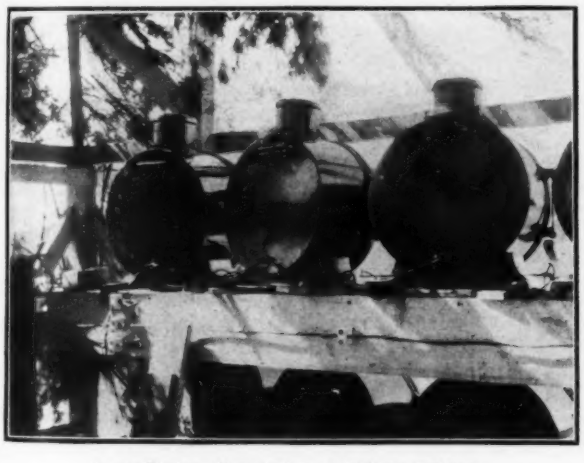
Each group of performers in the dramas bore a number, and an announcer board, lighted by 25-watt Mazda lamps, erected at the back of the grandstand, called the appropriate group to the stage at the proper time.

The results achieved in this noteworthy historical pageant, which commemorated the centennial of peace be-

Projectors in Lexington Pageant.



Projectors Mounted Behind Screen of Shrubbery.



Searchlights Mounted in Lighting Bridge.

Footlights Back of Steam Curtain.

tween the United States and Great Britain, reflected great credit on its originators and performers, and was an achievement in electrical art. The use of the floodlight projector, already demonstrated in sign lighting and the exterior illumination of buildings, was proven to be of the highest artistic value for performances of this kind.

The lighting director was Theodore C. Browne, the electrician of the Harvard Dramatic Club and of the theater at Harvard University where dramatic productions are tried out. Associated with him were ten Harvard electrical-course seniors.

L. C. Porter, of the Edison Lamp Works of the General Electric Company, Harrison, N. J., furnished expert advice during installing the apparatus and producing the pageant. The lights were operated on 110/220-volt energy from the Boston Edison Company's lighting service.

Boston Inspectors Visit Wire Factory.

The wire inspectors of the City of Boston were invited by the proprietor of the Bay State Insulated Wire & Cable Company to visit the factory at Hyde Park, Mass., on the afternoons of June 23 and 25. They came in two sections, one on each day, and were taken out in touring cars.

In the mill-room samples of rubber and other ingredients entering into the manufacture of wire were passed around for inspection. Considerable time was spent here, and while the visitors looked over the mills, refiners, washers, and vacuum dryers, Mr. McNamee explained with much detail the particular function which each was performing at that time. Particularly clear was his description and explanation of the theory of washing and drying of rubber by the vacuum system. But the chief interest of the party centered on a batch of new-code compound that was being mixed on the mill, during which operation the proprietor pointed out the various ingredients of the mixture, and the purpose for which each was incorporated therein. Samples of the warm uncured compound were then distributed for comparison with the same in later stages of the process.

Passing on into the insulating room, the visitors observed the rubber being forced on the wire through tubing machines, admired the dexterity of the operatives, saw the pans of wire loaded in to the vulcanizers to be cured and finally watched the cured product unwound and measured from the pans on to the reels. Here very briefly was explained the theory of vulcanization, and by a comparison of the uncured sample with those which were now at hand, the wonderful effect of the action of the sulphur upon the rubber was shown. The strength and elastic qualities of the rubber elicited many favorable comments.

The wire was now followed into the braiding rooms, where amid much clatter and din one saw all sorts of wire, from the smallest cord to a cable 650,000 centimeters in size, being covered with a cotton braid. Attention was called to the high-speed braiders located in this department, and Mr. McNamee spent much time in pointing out how the theory upon which these operated differed from that of the common textile braiders. Not the least impressive exhibit on this floor consisted of the winding machines where the cotton was wound at 1,200 revolutions per minute into packages for insertion into the braiding machines. Then, too, many of the inspectors being familiar with the Bay State mark "a black thread parallel to wire under the braid," expressed a desire to see this inserted, and were amazed at the simplicity of the process.

Next were visited, in turn, the weather-proofing and finishing room, the coiling room, and the packing room, where the wire began to assume the form in which it is seen in the market. The latter department contained probably the most interesting object in the factory, a coil-wrapping machine, which took the party by storm. Everyone expressed wonder at the neatness and speed with which it wrapped up the packages of wire.

Passing into the testing room the party inspected the high-tension and resistance apparatus, and watched the same in operation. Mr. McNamee here outlined to them the requirements and the system of inspection of the Underwriters' Laboratories. They were shown the record book and told in what way the factory record of a coil could be obtained by the use of the numbered stamps. This room being one of the quietest in the factory, a good opportunity was afforded for answering questions, which the guests availed themselves of, and had all their queries answered to their entire satisfaction.

The tour of the factory terminated in the stranding department, where all sizes of cables were in process of construction. Here were in operation huge machines capable of twisting 127 strands, also one twisting together 17 strands for a complete cable; other vertical machines for making smaller cables from seven wires and so on. Here, too, could be seen the machines for making flexible strand cords, and also those for wrapping a layer of cotton around these fine strands of copper.

Group of Boston Inspectors at Wire Factory.

Now, having for upwards of two hours been regaled with so many interesting sights, and having been mentally satiated by the clear explanations of the host, the guests passed into the shipping rooms, where the physical man was cheered and ministered to. After a very pleasant half-hour spent in this manner, the men trooped out to the front steps of the factory, and had their pictures taken.

Increase in Indiana Oil Production.

The petroleum output of Indiana in 1914 showed an increase for the first time since 1904, final returns to the United States Geological Survey crediting the State with 1,335,456 barrels, representing an increase of nearly 40 per cent over the output for the year of 1913.

SOME INTERESTING AND IMPORTANT LAW ABOUT BUYING GOODS.[1]

By Elton J. Buckley.

Touching the question of buying goods, and closing contracts for them, and so on, the following letter will be of interest:

New York, N. Y.

Please tell us whether we are bound in the following case. If we are we will have to change our whole method of buying from outside parties:

Considerable of our goods are purchased from outside concerns, chiefly in Chicago, Ill., and Omaha, Neb., and the negotiations are by mail. The houses in question do not have a New York agent. About a week ago we received a letter from one of these houses, located in Chicago, offering a quantity of merchandise for late August shipment at a certain price. The market in this line has been strong for several months, and at the time we received the offer, prices were high. We decided at once to buy, and within a few hours mailed a letter accepting the offer and placing the order. About an hour after this we received a tip from a reliable source that the market would break the following day. Our informant mentioned the price to which the market would drop, which made our order, just placed, look like a very bad buy. Accordingly, we wired the Chicago house to disregard our letter of even date. The market did break the next day and the Chicago house now seeks to hold us to the order. They duly received our letter of acceptance and say they will ship the goods late August. Have they any right to do that?

Respectfully yours,
Morgan & Barnes.

They have a perfect right to hold you to the order, and you are undoubtedly bound by it. The reason is that while an offer can always be withdrawn before acceptance, it can never be withdrawn without the other party's consent, *after* acceptance. The offer in your case was under the law accepted the minute you posted your letter. The mail was regarded as the seller's messenger, not yours, and when you committed your letter of acceptance to the mail, it was as if you gave it personally to a representative of the Chicago house.

The fact that your wire doubtless reached the Chicago house before your letter did, makes no difference. The thing was done the minute you *mailed* your letter.

As a matter of fact, it would have been a binding contract even had your letter of acceptance never reached its destination, or reached it after long delay. I remember a case in which A wrote to B making an offer of some goods, and telling him to reply by letter. B did reply by letter, accepting the offer, but the letter went astray and did not get to A until two days after it should have. Meanwhile A waited until time to receive B's answer, and not hearing from him, sold the goods to another buyer. The market had advanced and B sued A for damages for failure to deliver. A of course defended on the ground that he had every right and reason to sell the goods, but the court decided otherwise, and held that a contract existed from the minute B posted his letter. I confess I have never quite seen the justice of this, especially in cases where a letter of acceptance goes astray, for it seems like holding A, in the above stated case, for instance, to something that he couldn't possibly know anything about. However, it is the well-settled law.

As soon as there is an acceptance, there is a contract, but there must without doubt have been an acceptance. As I have explained, there is no question about a flat letter of acceptance, but there may be some doubt when acceptance depends on acts rather than words. I should say that a contract can be accepted by acts.

There was a case in which a firm that wanted to buy goods wrote to a man who made the particular thing wanted as follows: "Upon an agreement to furnish such and such, you can begin shipment in two weeks from date." The seller thought the buyer would take it for granted that he would furnish the goods inquired about, so he did not reply. He merely went out at once and bought the raw material to fill the order. The next day the order was countermanded. The seller tried to hold the buyer to it, but the court said "no, you never accepted the order."

Let me explain a little more in detail the legal principle that lies behind many of these cases. When A offers goods by mail to B, he chooses the mail as his, A's, messenger, and the mail waits for B's reply. If B replies by mail, accepting, there is legal acceptance and contract when the letter is mailed. But it must be the chosen messenger who gets the answer; otherwise there is no acceptance. For instance, A offers goods to B by mail, stipulating "if you want these reply by wire only, sometime to-morrow, the 8th." If B replies by letter instead of wire, and A has sold the goods before the letter is received, B has no remedy, for he took a chance by using his own messenger instead of A's.

What is sauce for the goose is sauce for the gander—after the letter of acceptance is posted, the other party cannot withdraw either, even though he posts or wires his withdrawal before the letter of acceptance reaches him.

1 Copyright, 1915, by Elton J. Buckley.

Strength of Radio Signals.

"Investigations of Quantitative Radio Receivers" was the subject of a graduation thesis presented by Horatio Wellington Lamson at the Massachusetts Institute of Technology.

The strength of wireless signals received from a distant station varies considerably from time to time. It is generally conceded that conditions of the upper atmosphere have much to do with these variations. A study of the relations between these phenomena should afford valuable meterological information.

There are two principal methods of measuring radio signals; one, the audibility method, which is accomplished by the use of a variable shunt resistance, the value of the shunt giving a measure of the strength of the signals; and the other, by the use of a d'Arsonval galvanometer, which gives more delicate measurements.

In practice, the sensitiveness of the detector varies and necessitates the standardizing of the measuring instrument. There are two methods of doing this; one, by using a small, highly sensitive thermal junction composed of very fine platinum wire against tellurium, placed in the aerial circuit, which was excited by a miniature buzzer transmitter. The junction can be calibrated as a thermo-ammeter and an absolute measure of the received energy obtained.

The other method consists in applying small 60-cycle potentials across the detector and measuring with the d'Arsonval the amount of rectified current produced. The calibration curve obtained shows at once that the rectified current and applied voltage are not proportional.

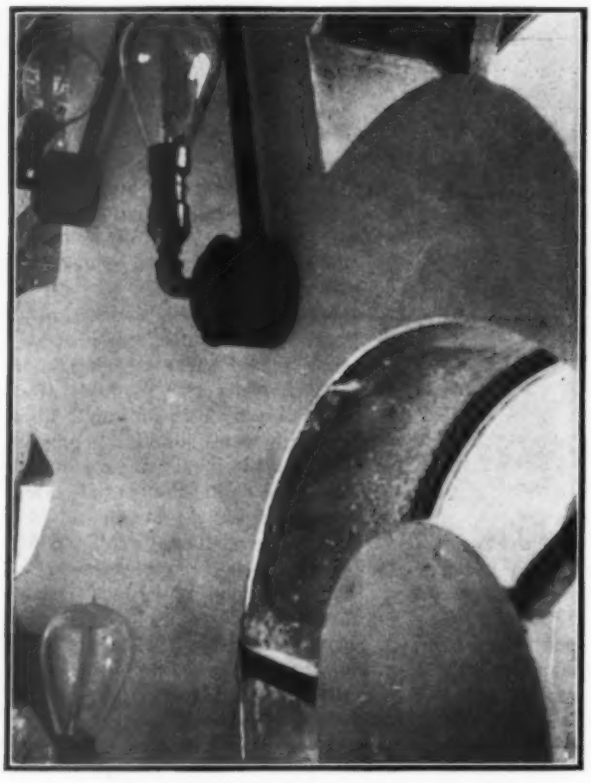
The author found that with a highly damped galvanometer it was possible satisfactorily to measure ordinary intermittent signals; the integrated effect of continuous steady transmission is remarkably constant and represents 45 or 50 per cent of the effect which would be produced were the energy to be received continuously instead of in the intermittent impulses of radio signals. It was found that a day of rainfall caused the signals from a station to be 1.8 times as strong on the following as on the preceding evening.

Few actual measurements of signals have yet been made, but the study revealed great possibilities in meterological and in radio fields.

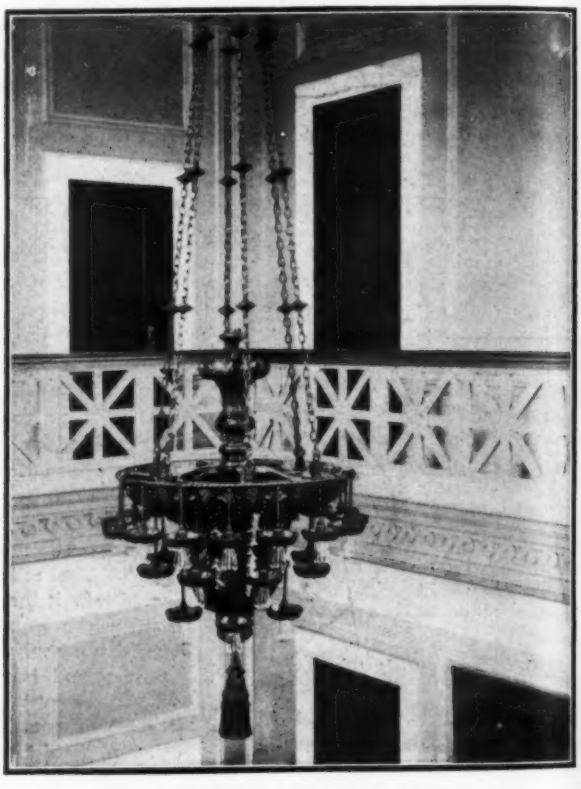
Electrical Features of Boston Custom House Tower.

The Custom House Tower, in Boston, Mass., which has been formally opened, is of unique construction, it being a 30-story structure erected on the existing granite Custom House. The tower is 494 feet high above street level, with two basements, and rests on reinforced concrete foundations 100 feet deep. The main shaft, devoted to business purposes, is 65 by 70 feet. The original Custom House was completed in 1847.

The electrical features are of interest. Beginning at the top, where some large beacon lights are likely to be installed in the near future, the great clock has some unusual features, in that it is lighted from chambers back of the dials, the reflected light shining through glazed openings in the 8-inch concrete wall through Arabic numerals designating the hours, and fashioned in sheet copper. All the figures are in a vertical position.



Mode of Lighting Numerals on Clock Tower.



Bronze Chandelier in Collector's Office.

The dials are 21 feet in diameter, the clock minute hand being about 9 feet long, and the figures are about 3 feet high. The illuminating chamber to each dial is entered from the twenty-third floor, and is 2 feet 4 inches wide, the circumference conforming to the surface of the dials. Iron ladders in the circular chamber walls, and an iron gallery across it, give access to the lamps, of which there are 70 in each chamber of 100 watts. The lamps are installed on 0.5-inch gas elbows from box connections on 0.75-inch conduit attached to the inner side of the outer wall. There are 12 circuits that supply the illuminating units and another supplying 12 and 15 100-watt lamps installed in the back of the clock hands. The interior of the chamber is painted a clear white, and the lamps are so located as not to be seen from the outside through the apertures forming the numerals.

A clock panel cabinet containing switches and fuses for 60 circuits is located on the twenty-third floor. In common with all the cabinets in the building, the frame and doors are of furniture steel painted to simulate mahogany.

The clock will be electrically operated from a master clock, from which a motor, located behind each of the four dials, will receive its impulse every minute and turn the hands forward, one minute at a time.

The hands are of wood, with metallic plating, and will be illuminated by a row of white incandescent lamps on the face of each hand (instead of back of hands, as originally planned) with a ruby light on the tip end of the hour hand and a green light on the tip of the minute hand.

A three-inch conduit connects the top of the wire shaft at the eighteenth floor with the clock cabinet, and a half-way supporting box is provided at the twentieth floor to support the weight of the cables.

From the eighteenth floor to the sub-basement is a terra cotta tile shaft 4 by 5 feet, which accommodates the plumbing and water pipes and the electric light and power and telephone cables. The electric cables are exposed, and are provided with insulated turnbuckles at the seventeenth-floor ceiling.

A lighting cabinet for each floor is located on the service stairway landing. Junction boxes are at the seventeenth and eighth floors, in the wire shaft, each serving the several floors below.

Four A B See elevators operate between the ground floor and the eighteenth, and one between the eighteenth and the twenty-fifth. The 25-horsepower motor and operating mechanism for the upper elevator is on the twenty-sixth floor, and here is the elevator signal-control apparatus which is operated through a motor-generator providing 10-volt energy.

The motors operating the four lower elevators are of 45 horsepower each and with the machinery are located on the nineteenth floor, which is given over to machinery. Here are located two tanks which provide water supply to the floors below. Water is pumped to the tanks by two Smith-Vaile triplex pumps in the sub-basement, each chain-driven by a 20-horsepower Triumph motor. A float switch on the tanks gives automatic control over the

motors, and a push-button switch, on the control panel near the motors, is also provided.

On the twenty-eighth floor is another tank, to supply the floors below to the nineteenth. This is supplied by a Deane pump driven by a five-horsepower Sprague motor, which is controlled by a float switch in one float chamber, and in another is a mechanism which operates an annunciator in the basement, indicating high and low-water levels.

An "Invincible" vacuum system, manufactured by the Electric Renovator Company, Pittsburgh, Pa., is installed, the compressor being in the sub-basement and driven by direct connection by a General Electric variable-speed motor with a maximum speed of 3,500 revolutions per minute and rated at 15 horsepower on open continuous service.

For Lamson pneumatic service a Connersville compressor with 10 cubic feet displacement per revolution is operated by an eight-horsepower Diehl motor, its starting control being a snapswitch at each station of the tube-service.

A sump pump below the sub-basement floor is operated by a two-horsepower Triumph motor controlled by a float.

The lighting of the building is worthy of note. Under the central dome are 66 60-watt Mazda half-frosted lamps set in plaster rosettes under a cornice. These units are controlled by two sets of switches which give alternate lighting, through two solenoid switches on the third-floor lighting cabinet and operated by momentary-contact remote-control switches in the first-floor lighting cabinet.

Under the gallery above the first floor are 12 groups of four 40-watt Mazda lamps in ground-glass bowls pendent on short bronze chains which bring the lamp groups about 18 inches below the ceiling.

The lighting of the hallways is with 60-watt Mazdas without shades, installed close to the ceiling. In the offices generally, bronze chain pendent fixtures with translucent balls containing single 60 or 100-watt lamps prevail.

The auditor's room is provided with indirect lighting, which consists of two handsome bronze electroliers about 4 feet 6 inches in diameter, about 12 feet below the ceiling, containing 26 15-watt Mazda lamps, and 12 electroliers of similar pattern about 2 feet 6 inches in diameter, about 8 feet below the ceiling; and under a gallery which divides the height of the room, are 10 similar electroliers about 2 feet below the ceiling. The latter contain 12 and 15 15-watt lamps each.

Indirect Lighting Fixtures in Auditor's Room.

The collector's room is provided with a combination of direct and indirect lighting, the principal fixture being a 4.5-foot central chandelier carrying a cluster of 28 15-watt lamps in inverted position, and six 100-watt Mazdas installed on the upper side of the electrolier, giving indirect lighting. Hooded desk lamps are also provided.

The main switchboard is in the sub-basement and contains six switches on two panels, for lighting service, and twelve switches, on two panels, for power service. All switches are of the double-pole type and were supplied, together with the board, by the Taunton-New Bedford Copper Company, Boston. Circuit-breakers operated by an emergency switch in the basement corridor are installed on the incoming mains, which provide 220-volt direct current for the motors and 110/220 volts for the lighting. The energy supply is from the Edison Electric Illuminating Company of Boston.

The interior wiring was by Edwin C. Lewis, Inc., of Boston, Mass., and the fixtures were furnished by E. F. Caldwell & Company, New York.

A Scottish Hospital Installation.

At the Royal Hospital for Sick Children at Glasgow, Scotland, a very complete electrical equipment is installed. All the machines in the laundry—washing machines, hydro-extractors, ironing and finishing machines—are electrical and a large drying room is served with an electric hoist. Some of the machines have motors direct-coupled and others are belt driven. The premises are illuminated by 2000 metal-filament lamps. Thirteen electric elevators, electrically driven ventilating fans, and a thirty-station intercommunication telephone system, as well as thirty electrically operated and controlled clocks, form part of the general installation. Electro-surgical, Röntgen ray, high-frequency, and other special electrical apparatus are installed.

The supply is obtained from the Glasgow Corporation, being brought in duplicate cables to each of two main switchboards in the basement of the building, duplication being used to provide against interruption. The operating theaters are also served in duplicate with local control.

The general illumination of the wards is obtained by central pendants, the lamps being screened from the bed positions. One pendant in each ward is of inverted type for night use. Beside each bed are local brackets and portable hand lamps. The corridors, passages, and stairways have ceiling fittings of inverted cone shape on the bottom to which the lamp is fitted. These cones are treated as part of the ceiling and painted to match.

In the operating theaters light from an external source is employed for the operating tables. Arc-lamp projectors are installed in an adjoining chamber, the beam of light being projected through a glazed aperture in the wall and on to the operating table by means of adjustable mirrors. The general illumination of the operating theaters is effected by special sunk fittings with flush glazed bronze covers. These frames fit into position by their own weight, and have no fixing studs or screws, but they are watertight.

James E. Sayers and James Caldwell, Glasgow, acted as consulting engineers.

INTERESTING FACTS ABOUT THE AUTOMOBILE BUSINESS.

By G. Brewer Griffin.

As is well known, most of the automobile manufacturing companies have a production season of about eight to ten months on each series of cars, and through the past several months of general business depression their business has kept nearly normal—and at this writing is abnormal, as the supply is hardly keeping pace with the demand.

The following figures might be of interest.

Total number of cars manufactured to which electrical starting and lighting equipments are applied.....	261,860
Total number of all cars produced in the United States the last calendar year.....	611,695*
Approximate total value at dealers' prices.....	$380,000,000*
Approximate average dealers' value per car.....	$621.50*
*Including Ford cars, 350,000..	$136,500,000
Total value of the electrical equipment	$ 10,354,570

There has been a great deal of talk among uninformed people as to the instability of the automobile manufacturing business and of the drain on the resources of the people that the purchase and use of an automobile represents.

Disregarding for the moment the operating expense and upkeep which the individual assumes, let us consider how many different classes of business the automobile industry, of such an enormous volume as above mentioned, helps to maintain, ignoring altogether the truck production of the country which comes outside the consideration, as the purchase and use of commercial vehicles need no brief of defense.

It means that there has been consumed on new cars alone for 1915, conservatively estimated, approximately

670,000	tons of fabricated steel.
4,020	tons of aluminum and alloy.
2,141	tons manufactured brass.
1,068	tons of curled hair.
2,050	tons of moss.
67,232	hides (one-third hide per car).
3,280,000	square yards imitation leather, (8 yards per car).
$917,542	in upholstering fittings, such as cord, tape, buttons, snaps and similar trimmings
6,560,000	yards burlap, etc.
11,405,250	yards of top materials and linings, (value approximately, $2,447,780).
7,950	tons manufactured cotton, used in the carcass of automobile tires (on new cars only).
300,000	pounds sheet celluloid.
9,338	tons rubber and compound.
2,446,780	pairs of hinges.
2,446,780	door-catch fittings.
489,356	square yards carpet for tonneau.
642,908	square yards linoleum for running boards and toe boards.
8,450,850	board feet manufactured hickory and other woods for floors, top bows, wheels, body frames, running boards, etc.

All these materials have to be and are largely fabricated by manufacturers who supply the automobile concerns, and a few moments' reflection will show the enormous army of workers employed in this field.

In the starting, lighting and ignition industry alone are employed to-day between nine and ten thousand people, and when we stop to consider the other materials that are used by them in making their part of the car—such as lead, in the storage batteries; iron oxide, rubber, aluminum and copper wire, magnalium; platinum, etc.—one will soon see how many different branches of industry are affected by the automobile business. And we have not begun to consider the millions of gallons of gasoline that are being distilled or the great quantities of lubricating oils and greases, paint and varnish, putty, etc.—all of which has given employment to producers and manufacturers, their salesmen, dealers and others. And it all helps the banks, as the money passes through their hands several times from purchaser to manufacturer.

The prices of automobiles were never so low and never was so much attempted for the money as today. The investment is not much for a comfortable, roomy car that operates well and stands up reasonably well in service.

BOOK REVIEWS.

"Shrapnel and Other War Materials." New York: McGraw Hill Book Company, Incorporated. Cloth, 92 pages (8½x11½ inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for $1.50.

This is a compilation of articles which have appeared in the *American Machinist*, during the current year. The treatment of the subject is from the standpoint of the shop man, and the various articles take up not only the manufacture of shrapnel and other materials, but a description of what these articles of ammunition are and how they are used. Special machinery for manufacturing shells, cartridge cases, and various other parts is described. The book will be of interest to all of those wishing information on the mechanical sides of these manufacturing processes.

"Practical Mechanics and Allied Subjects." By Joseph L. Hale. New York: McGraw Hill Book Company, Incorporated. Cloth, 228 pages (4½x7 inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for $1.00.

This is a companion book to "Practical Applied Mathematics," which was recently reviewed in these columns. The book is intended for use in the railroad shop apprentice schools which are being conducted by the Pennsylvania Railroad and should be well suited to the needs of vocational, trade and corporation schools as well as to certain classes in the regular public schools. In the form of instruction sheets these chapters have been tried out in the school work and have been found to meet the needs of this class of students. The book is divided into 20 chapters. The simple physical conceptions are first taken up, with applications to screws, levers, and other mechanical devices, such as gearing, with which the student will come in contact in the shop. One chapter is devoted to electricity, some of the simple relations of the latter subject being explained, with a special reference to power and energy. One chapter is devoted to logarithms. The final chapter is devoted to strength of materials and will give the student a good idea of the nature of stress and strain, elastic limit, the elements of strength, etc. The book is well printed and seems well fitted to serve its purposes.

"Directions for Designing, Making and Repjairing High-Pressure Transformers." By F. E. Austin. Montpelier, Vt.: The Capital City Press. Paper, 46 pages (4½x7½ inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for 50 cents.

After some introductory matter of an explanatory nature, this booklet points out the elements of design of a transformer and gives directions for practically applying this design in the construction of an actual transformer. An elementary knowledge of electrical relations is a prerequisite to an understanding of the various steps involved, as the material is put in rather concise form. A student of the subject should, however, have no difficulty in completing an experimental transformer by following the directions given. An estimate of the cost is included.

"How to Make a Transformer for Low Pressures." By F. E. Austin. Northfield, Vt.: Northfield Publishing Company. Paper, 14 pages (4½x7 inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for 25 cents.

This booklet is even more brief than the one above referred to by the same author and is confined entirely to practical directions for construction. The author states that many transformers have been successfully built by following the directions given and the performance of these transformers has been remarkably good. The book is a suitable one to put in the hands of the young man or boy who is interested in electrical experiments for the purpose of instructive amusement.

The total production of coal in Ohio in 1914 was 18,843,115 short tons, having a value at the mines of $21,250,642. In view of the fact that practically all the Ohio miners were on strike and the mines idle from April to July, the production fell off heavily—nearly 50 per cent as compared with 1913.

New Electrical and Mechanical Appliances

Replacing Insulators Upon Live Lines.

A patented set of tools has been developed by the Cronin Electrical Appliance Company, Wapakoneta, O., for handling live high-voltage wires and making replacements of insulators and cross-arms upon such lines without interruption of service. The tools which are used in this work are shown in Fig. 1. These tools are mounted upon the ends of wooden rods, which provide insulation so that it is possible for linemen to carry on the work without danger. The hook shown in the left of this figure is used for untying tie wires, while that shown in the hand of the lineman to the right is used in holding

Fig. 1.—Tools for Handling High-Voltage Wires.

Fig. 2.—Removing Broken Insulator.

the line away from the insulator while the assistant replaces the latter. This is so constructed that it is almost impossible for the line to escape from the tool and come in contact with the lineman. This tool is shown in use in Fig. 2.

When it is necessary to replace a cross-arm all of the insulators on this cross-arm are untied from the line wires and the line wires are lifted above the regular position and out of danger of contact, as shown in Fig. 3. The cross-arm can then be removed and replaced, whereupon the line wires are lowered into position and tied to the new insulators.

These tools have been used by the Western Ohio Railroad Company for over two years with most excellent results and without any interruptions to service. Business has been obtained and retained, which could not be held unless 24-hour service was supplied. It has been found, too, that it is cheaper to make repairs in the daytime with a live line than to send out a crew of men at night for this purpose, even with the current cut off.

Electrolytic Iron.

From a recent issue of the *Revue de Metallurgie*, it appears that La Société Le Fer, of Grenoble, has attained some striking results in the production on a commercial scale of electrolytic iron. The metal is deposited on a rotating cathode, the electrolyte being a neutral solution of ferrous salts which is circulated over iron turnings in order to maintain this neutrality. At regular intervals also, additions are made to the solution of oxide of iron, which acts as a depolarizer and prevents hydrogen collecting on the cathode to a deleterious degree. The current density used is 1,000 amperes per square meter.

The deposit obtained is excellent from a chemical standpoint. The deposited metal contains 0.004 per cent of carbon, 0.007 per cent of silicon, 0.006 per cent of sulphur and 0.008 per cent of phosphorus. In its unannealed condition the iron is very hard and brittle, but on annealing for two hours at a temperature of 900 degrees Centigrade, it shows normal microstructure and is extraordinarily tough under mechanical tests.

The process is proposed for the manufacture of very thin tubing, and, in some preliminary work, tubes uniform in thickness and four meters long have been produced in gauges ranging from 0.1 to 6 millimeters. Plates have also been produced which, in view of the extraordinary toughness of the material, are excellently adapted for stampings.

The magnetic properties of the deposited metal make it exceptionally suitable for the construction of transformers and other electrical appliances.

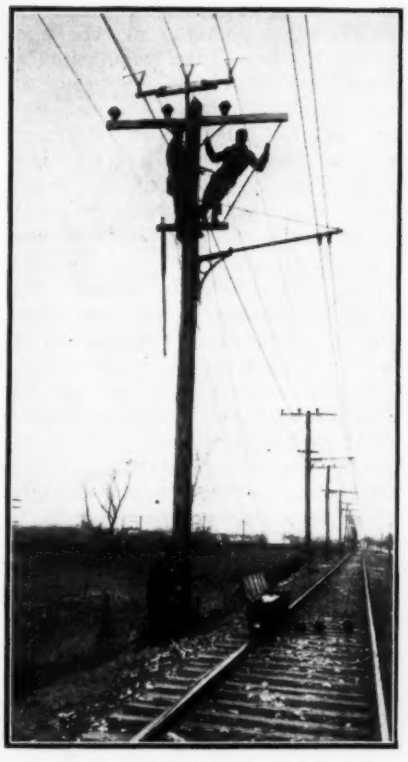


Fig. 3.—Removing Defective Cross-Arm.

Globe Electric Ranges.

Realizing that electricity is revolutionizing household economy and that electric cooking in particular is no longer in the experimental stage, the Globe Stove & Range Company, Kokomo, Ind., has developed and placed on the market a line of high-class electric ranges for domestic use. In the design and construction of these appliances is incorporated an experience of over 36 years in the manufacture of stoves and ranges for practically all fuels, especially wood, soft and hard coal, and gas. This extended experience, together with the policy of producing goods to meet the most exacting requirements, has been the secret of the excellent reputation possessed by the Globe products.

Fig. 1.—Compact Electric Range.

Prominent among the features kept in mind in designing the new Globe electric ranges were the following: reliability, wholesomeness, simplicity, safety, economy in operation, accessibility of all parts and general practicability. All of these are features for which there has been a growing demand in the modern home. The accompanying illustrations give an inadequate idea of the sanitary attractiveness of these ranges, which are built almost entirely of steel, highly polished and doubly nickeled on the edges and with the larger surfaces of white porcelain enamel. This high finish, together with the simplicity and sturdiness of outline, makes all parts of the range easily kept clean and bright. The ranges are mounted on easy rolling casters to permit moving away from the wall for cleaning back of and under the range. A heavy flexible cable connects the range from the back to a special wall outlet; if desired, however, the casters can be removed and the range rigidly connected through iron conduit.

Fig. 2.—Electric Range With Elevated Oven.

Three styles or classes of these are now available ranging in price from high to medium to low. Only the high priced line is shown in the illustrations. The range shown in Fig. 1 is the most compact. It has four hot plates on top controlled by individual snap switches located directly under the edges at the sides. The oven is arranged for baking, roasting and broiling and has its upper and lower units controlled by switches directly below the oven. Here also is a main switch for the entire stove and, if desired, an automatic adjustable thermostatic switch, shown to the left of the master switch in Fig. 1, by means of which the oven temperature can be set and kept at any point. The oven door has a thermometer in the center.

Fig. 2 shows a Globe electric range in a form that has become popular with many housewives. On the apron directly below the top plates are the switches controlling these four hot plates, then there is a red pilot lamp to indicate when any of the various units is still "on," then a thermostatic oven-temperature-regulating switch, the main switch, and the switches for the upper and lower units of the oven. The oven is practically like that of the range shown in Fig. 1.

The range shown in Fig. 3 has its right-hand oven of practically the same size as those already referred to; the left-hand oven is much larger, however. The control panel is at the back on top and includes not only the individual switches for the four top plates and the upper and lower units of the two ovens, but also a main switch, a thermostatic regulator, a pilot lamp, and two receptacles at the ends for connecting portable appliances.

Fig. 3.—Globe Range With Two Ovens.

Each switch is clearly marked and the position of each corresponding plate is also stamped on the top surface to avoid confusion; this is also true in the other ranges.

An important feature of all of the heating units is that they are removable for inspection, cleaning or renewal. Fig. 3 shows how the top units can be easily lifted out for this purpose; the upper and lower oven units can be pulled out readily, as shown in the right-hand oven. Each unit is connected to its circuit by plugging terminals, so that no binding screws have to be loosened or wire connections broken. The top plate units are of the glowing type mounted in an insulating and heat-reflecting body. The smaller of these plates have one heat taking 770 watts; the larger units have three heats taking 1,100 watts maximum.

The manufacturers claim a double efficiency for their heating unit, due to its peculiar construction. The resistance wires are laid in grooved porcelain. Over this porcelain a metal plate is clamped, slotted to correspond with the grooves in the porcelain. A vessel placed on top of this unit, therefore, receives the radiated heat from the glowing wires, and in addition, the heat stored or collected in the metal top plate. It is their claim that their heating unit is a combination of the inclosed and open types of units now on the market.

All of the oven units are arranged for three heats. In the smaller ovens these units take 1,000 watts maximum on top and bottom. The large oven at left in Fig. 3 has a 1,000-watt unit on top and a 2,000-watt unit on the bottom. The bottom units are mounted in metal plates to distribute the heat uniformly. The upper units are of open-grid type with the heating element supported by porcelain bushings that are cast right into the transverse bars. These upper units are specially serviceable for broiling.

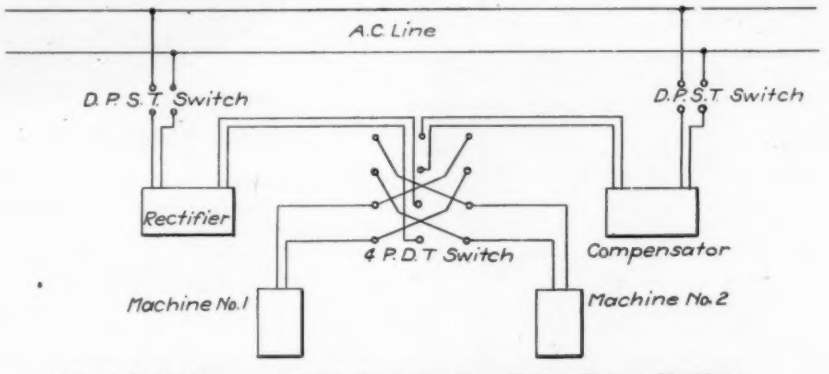
Each oven is built on the heat-storage or fireless-cooker principle, that is, the walls, top, bottom and door are several inches thick and filled with Kieselguhr, which is a mineral substance noted for its heat-insulating qualities. Around the edges of the doors are asbestos joints arranged in stepped fashion like the door of a safe. The door hinges and handle are strong, easily operated and keep the door very tight when closed. Thus no heat is wasted and the kitchen remains cool on the hottest days.

The total connected load of the largest range is 8.5 kilowatts, but it is very seldom that all units are in full operation. In the design of these ranges it was felt desirable to provide liberal current capacity in all of the units, so that cooking and baking operations could be carried on with as much dispatch as on a coal or gas range and with more thoroughness. With a little experience, however, it is found that electrical energy consumption can be kept down to a reasonable figure that makes the use of the range by no means prohibitive.

The commercial work of the electrical department of the Globe-Stove & Range Company is in charge of P. L. Miles, who has opened a Chicago office in the Edison Building.

A Motion-Picture Problem Solved.

Living in the atmosphere of active competition from rival attractions, the modern motion-picture theater manager has long since realized that to draw the crowd to his house he must make it attractive. Not only must he have a well ventilated auditorium, up-to-date lighting and advertising, an attractive lobby and, of course, good pictures but he also must furnish a projecting light that will show the film to the best advantage.



Throw-Over Arrangement for Operating Two Motion-Picture Machines.

The outside attractions will bring the patron to the house, but if the pictures and their presentation do not leave a pleasant impression he is not likely to return. Where alternating current is used for projection work it is practically impossible to secure a satisfactory picture because of the unsteadiness and noise of the arc and the low intensity of the light. This has been overcome, however, by the use of a mercury rectifier or other converter for changing the supply into direct current, which gives a clear steady white light especially adapted for projection purposes. Alternating current, in addition to the noise, low intensity and flicker, is said frequently to produce eye strain that is not only objectionable but often so serious in its consequences that several states have formulated laws against its use for motion pictures.

The critical and exacting public of today has demanded that there be no appreciable interval of waiting between the end of one reel and the beginning of the next. The operators have promptly responded to this demand by furnishing two machines, keeping one "loaded" while the other is operating.

Where the size of the theater and equipment only justifies the use of a single rectifier, the problem of making one reel blend into the other would seem to be without a solution. It has, however, been happily solved by some Philadelphia operators with a very ingenious but simple arrangement.

The only equipment used in obtaining this solution consists of a four-pole double throw-switch, a Westinghouse rectifier for motion-picture work, and a compensator or economy coil, such as is generally found in a theater using alternating current. By means of this scheme, which it will be noted involves the use of practically no additional apparatus to that already available, a change can be made from one reel to another without its being detected by the patrons.

The scheme will be easily understood by referring to the accompanying diagram. The operator, we will say, is showing the first reel of a feature film on machine No. 1 fed from the rectifier, the four-pole switch being thrown to the left. About one minute before the end of the reel is reached, he throws the switch to the right, starting the arc on machine No. 2 through the rectifier, while machine No. 1 is transferred to the alternating-current circuit through the compensator, and the reel is completed in this manner. This gives the carbons on No. 2 time to burn to their proper brilliancy, ready for beginning the second reel.

The process is repeated towards the end of the second reel on No. 2 machine. The procedure may be reversed if desired, that is, starting No. 2 machine on the alternating current and later throwing on the direct current. However, the first-mentioned method will be found more satisfactory as it takes a few seconds for the direct current to burn the carbons properly while the alternating current causes the carbons to sputter under all conditions but less when they are already heated by the direct current.

The output of petroleum in Louisiana in 1914, which amounted to 14,309,435 barrels, exceeded the output in 1913 by 1,810,607 barrels, or over 14 per cent.

Direct-Connected Exciters.

A single great reservoir of power, to be drawn upon as required, was once believed by power-plant designers to be the ultimate development of the central station. Carrying out this idea, all of the generators were to be connected to one busbar and would be excited from a central direct-current system. However, as central stations were built in increasing capacities, the necessity for subdivision on account of excessive short-circuit currents became manifest.

The present tendency is to lay out the station as a number of independent units, so that trouble on part of the system will not cause a shutdown of feeders and apparatus other than those directly affected. Especially is this trend noticeable in the case of hydroelectric plants where the power is used over a wide territory and must be delivered over long transmission lines which are particularly liable to trouble. To render each generator unit independent, many engineers, among them P. M. Lincoln, president of the American Institute of Electrical Engineers, now favor the use of individual exciters, each connected to its own generator.

Individual Exciter Mounted on Top of Large Vertical-Shaft Water-Wheel Generator.

The Westinghouse Electric & Manufacturing Company has perfected a line of exciters especially adapted for such service. The chief point urged against direct connection is that trouble in the exciter necessitates shutting down the generating unit unless leads are provided for exciting the generator from some other exciter unit. Hence reliability is the primary requirement in exciters designed for direct connection. Westinghouse designers have fully recognized this fact, and these exciters are characterized by rugged mechanical details and great overload capacity.

While these exciters are generally built specially for the particular generator to which they are to be attached, in the details of their design and construction they are similar to the standard Westinghouse engine and belt-driven direct-current generators.

Several methods of mounting the exciter are employed. In the case of a vertical generator the exciter is carried by the thrust-bearing bracket. With a horizontal generator, the exciter frame may be mounted on an extension of the generator bed plate, on a bracket attached to the bearing pedestal, or on a separate base.

The use of the direct-connected exciter has the following advantages. Each generator is dependent upon only its individual exciter, the number of plant auxiliaries is reduced, rheostat losses tend to be less, belts and belting troubles are eliminated, and a neat and compact appearance is secured.

The cost of the direct-connected exciter varies somewhat with the type of main generator with which it is to be used. This is due to the varying amount of excitation required by the alternator, which depends materially on its operating speed. A slow-speed unit will require more excitation than a higher-speed machine of otherwise similar characteristics, and the slower the exciter runs, the more expensive it will be. For this reason, direct-connected exciters for engine-driven sets or slow-speed water wheels make a more expensive layout than where the higher-speed water wheels, belted, or turbo-driven generator is employed.

In addition to the advantages of greater freedom from trouble, etc., it is frequently true that an outfit of direct-connected exciters will be cheaper than any other arrangement. This is particularly the case in hydroelectric plants where other arrangements, affording equal independence, entail a much greater first cost.

Direct-Connected Exciter Mounted at End of Horizontal Shaft in Hydroelectric Plant.

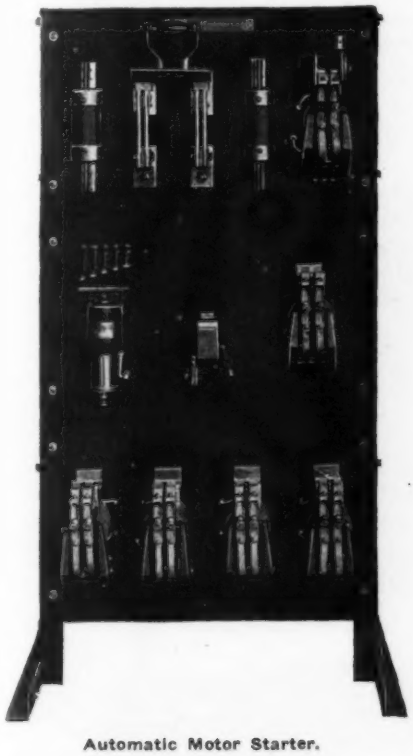
Bituminous-Coal Production in Pennsylvania.

Pennsylvania produced 147,983,294 tons of bituminous coal in 1914, according to figures made public by the United States Geological Survey, the value of the ouput being $159,006,296.

New Automatic Motor Starter.

The Industrial Controller Company, Milwaukee, Wis., has recently put on the market a new automatic controller which has been termed the type G. M. In this automatic starter the various steps of resistance are cut out by separate magnetic switches, these switches being controlled by a master solenoid which closes the control circuit of the various switches in their proper sequence. As the magnetic switches close quickly and positively, the arcing on the contacts is reduced to a minimum.

The motor circuit is opened and closed by the first magnetic switch, which is fitted with a powerful blowout. All switches have removable contact tips on the stationary and movable contacts and copper brushes are used to carry the current. The design of the switches is such that the magnet coil and all wearing parts can be removed from the front of the panel.



Automatic Motor Starter.

The master switch is similar to the Industrial Controller type E automatic starter and consists of a completely inclosed solenoid, below which is mounted an air dashpot of the vacuum type which governs the time of acceleration. Above the solenoid are a number of resiliently mounted contacts, which are successively engaged by a contact bar as the solenoid is drawn upward. Each of these contact fingers controls a magnetic switch, which in turn controls one step of resistance. The time of acceleration can be varied over a wide range by adjusting the air-inlet valve at the bottom of the dashpot.

This type of control system is extremely simple, and eliminates all interlock switches in connection with the magnetic switches governing the starting resistance.

New Appleton Unilet Fittings.

Since the line of Unilet boxes and fittings was brought out a few years ago by the Appleton Electric Company, 212 North Jefferson Street, Chicago, Ill., there have been frequent additions which have greatly extended the adaptability of these fittings to special situations and made them usable with many devices made by other manufacturers.

The accompanying illustrations show some further recent additions to the Unilet line. Fig. 1 shows a new cord rosette especially designed for use with one-half-inch rectangular Unilets. In Fig. 2 is shown a new attachment-plug receptacle for the same size and type of Unilets; this receptacle takes the standard Hubbell caps. A new one-piece receptacle for use with octagonal Unilets 2.75 inches in diameter is shown in Fig. 3. The new cover illustrated in Fig. 4 is designed for switch Unilets in which the new Hubbell duplex receptacle is installed.

Fig. 1.—Rosette.

Fig. 2.—Receptacle.

Fig. 3.—Receptacle.

Fig. 4.—Cover for Switchbox.

Fig. 5.—Adapter for Ceiling Box.

A new ceiling-box adapter is shown in Fig. 5. This is very useful in places where an ordinary ceiling box without ears has been installed and it is desired to use a cover over the box. The adapter can be readily applied and holds the cover securely by means of two screws.

Although California oil has to a large extent displaced the use of coal as a fuel in the Pacific Coast States, two California mines reported an output of coal in 1914.

Wireless Station for Carnegie Institute.

At a cost of $1,500 the Carnegie Institute of Technology, Pittsburgh, Pa., is installing in the tower of Machinery Hall a radio plant which it is said will be the most powerful in that part of the country. The plant will have a wide range of places with which it may communicate, the western boundary being Honolulu and the eastern Germany. Communication will also be established with other technical schools in the country which have radio equipment.

The station is being installed for the use of the student radio club, an organization of electrical students. The equipment of the new station consists of a 10-kilowatt motor-generator set of the latest type, and an audion detector.

Neuco Electric Cooking Appliances.

A line of electric cooking appliances has been put on the market by the National Electric Utilities Corporation, 357 West Thirty-sixth Street, New York City. This equipment has been built especially to stand continuous hard usage. The bodies are of heavy cold-rolled steel, double-walled throughout and heavily insulated for heat. The outer casings are black-enameled by a process which makes the steel rust-proof and polishing is unnecessary. The inside linings are of baked aluminum finish. They are clean, white and sanitary. Nickeled trimmings are used for the exterior finish.

Fig. 1.—Household Range No. 901.

Fig. 1 shows the electric household range. This is equipped with four cast-iron hot plates upon the cooking top, which is 31 inches from the floor. Each

plate is 8.75 by 10.25 inches in size, and each is controlled by a separate three-heat switch. There are also separate switches for the oven, which is below the hot plates, and for the elevated broiling oven, which is seen at the top. Extension shelves are provided at each side. The maximum consumption of this unit is 500 watts for each hot plate, 1,320 watts for the large baking oven, and 2,200 watts for the broiling oven. The floor space occupied is 35 by 26.5 inches and the total height is 64 inches.

Another type of electric household range is shown in Fig. 2. This type has no broiler, but is equipped with six hot plates. It is 33.25 inches high. The large oven consumes 1,457 watts. When desired this unit can be equipped with an additional broiler heat unit in the top of the oven.

Another type of household range is like that shown in Fig. 2, with the addition of an upper oven smaller than that shown and also a broiler. The small oven consumes 825 watts. This range is especially designed for the requirements of large families.

Fig. 3 shows an individual bake oven mounted on a skeleton stand. This is supplied either with or without lower shelf.

Fig. 4 illustrates the double electric hotel broiler, which is designed for restaurants, hotels and public institutions where double service requires a separate fish broiler. The company also makes other types of ovens, plate warmers, electric steam tables and ranges.

Fig. 3.—Electric Bake Oven.

Fig. 2.—Household Range No. 888.

Fig. 4.—Double Hotel Broiler.

Both hot plates and broilers are equipped with a radiant type of heat unit. They fit in flush with the top or cooking surface, and the element is entirely inclosed, thus protecting them from short-circuit in case liquids are spilled upon them. The heat unit is designed on scientific principles, is of simple construction and sufficiently strong so as not to warp or break down under intense heat. Special reflectors are used to concentrate the heat at the point where it is needed. These reflectors are made of white porcelain.

The heating unit consists of a heavy iron frame with a number of transverse iron supports or cross bars so arranged as to allow for contraction or expansion. The cross bars have seats for holding insulators in the shape of a pulley through which the coiled resistance wire is strung. There is little opportunity for a short-circuit. If for any reason the heating unit should become damaged it can be easily replaced or repaired.

Roebling's New Factory Nearing Completion.

Several months ago the lower works of the John A. Roebling's Sons Company, Trenton, N. J., were destroyed by fire. These works had been used in the manufacture of insulated wire and cable. Reconstruction was begun at once, and new fireproof buildings of the most modern type will be completed in a few months. These buildings are of reinforced concrete and brick, are specially designed and comprise the last word in wire-manufacturing structures. They will furnish when completed about ten acres of floor space. While the fire was a very disastrous one, the Roebling's by good planning and operating night and day, that part of these works that were not destroyed, have been able to take care of their large business.

The United States is the greatest paper-producing country in the world by a very wide margin. In 1909 the total value of the products of the American paper mills was nearly $270,000,000 and, if the rate of increase recorded for a half-dozen years previous to 1909 has held good since, the present annual production is well over $300,000,000. That total is nearly three times the value of the product of the next great producing country—Germany.

Latest Approved Fittings

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

CONDUIT OUTLET BUSHINGS.—The Sterling Foundry and Machine Company, 55 Hartford Street, Newark, N. J.

"Sterling" armored cable connector for use with standard outlet boxes with knockouts for one-half-inch conduit and consisting of a cast-iron sleeve with a thread and locknut for attaching to the box. and a clamping screw for securing the cable.

Listed July 6, 1915.

FITTINGS FOR CONDUIT BOXES, Covers.—Steel City Electric Company, 1207 Columbus Avenue, Pittsburgh, Pa.

Stamped steel conduit boxes with single metal-bushed hole for pendent of reinforced flexible cord.

Catalog Nos. AD, AF, BD, BF, CD, CF.

Listed May 24, 1915.

OUTLET BUSHINGS.—The Adapti Manufacturing Company, 919 West Street, Cleveland, O.

Connector bushings of malleable iron or pressed steel, for connecting armored cable or flexible conduit at outlets.

Listed June 8, 1915.

RECEPTACLES, For Attachment Plugs.—The Bryant Electric Company, Bridgeport, Conn.

Bryant or Perkins. Flush type.

Junior, 6 amperes, 250 volts, 12 amperes, 125 volts, catalog No. 509.

Listed July 13, 1915.

RECEPTACLES, Standard. — The Arrow Electric Company, 103 Hawthorne Street, Hartford, Conn.

Arrow E, metal-shell receptacles.

Keyless, 660 watts, 600 volts, for use on metal ceilings, catalog Nos. 78 and 85.

Also connection block for two-way metal bases for metal molding, catalog No. 405.

Listed August 5, 1915.

RECEPTACLES, Standard.—H. T. Paiste Company, Thirty-second and Arch Streets, Philadelphia, Pa.

Paiste brass-shell receptacles.

Key, 250 watts, 250 volts, catalog Nos. 5437-46-55-64-73-82-91, 5545-51-57-63-69, 5626-35-44, 5800, 5845, 9184, 50753, 60018, 100199, 100205.

Keyless, 660 watts, 250 volts, catalog Nos. 5438-47-56-65-74-83-92, 5546-52-58-64-70, 5627-36-45, 5801, 5846, 9185, 50717-18-55, 60019-20, 100200, 100206.

Pull, 250 watts, 250 volts, catalog Nos. 5439-48-57-66-75-84-93, 5575-78-81-84-87, 5632-41-50, 5802, 5847.

Also all of the above types with shadeholders attached.

Listed July 5, 1915.

SOCKETS, Standard, Insulating Links For.—The Bryant Electric Company, Bridgeport, Conn.

Bryant or Perkins.

Detachable insulating link for socket and receptacle chains, catalog No. 513.

When used on pull-chain sockets or receptacles in manner intended, this insulating link is judged to afford a person operating socket added protection against shock from circuits of voltages of not over 600 volts.

Listed July 23, 1915.

SWITCHES, Pendant Snap.—The Arrow Electric Company, 103 Hawthorne Street, Hartford, Conn.

Single-pole, 3 amperes, 250 volts, 6 amperes, 125 volts, catalog Nos. 6601, 6602, 6603, 6701, 6702, 6703.

Listed July 13, 1915.

SWITCHES, Surface Snap.—The Arrow Electric Company, 103 Hawthorne Street, Hartford, Conn.

Arrow E. (With porcelain covers.)

Single-pole, 3 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6260 and 6261.

Single-pole, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog Nos. 6280 and 6282.

Double-pole, 10 amperes, 250 volts, catalog Nos. 6284 and 6286.

Three-way, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog Nos. 6288 and 6289.

Four-way, 2 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6290 and 6291.

Two-circuit, 2 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6292 and 6294.

Three-circuit, 2 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6296 and 6298.

Also above types with lock attachment.

Listed July 12, 1915.

SWITCHES, Surface Snap.—The Arrow Electric Company, 103 Hawthorne Street, Hartford, Conn.

Arrow E. (With metal covers.)

Single-pole, 3 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6100-6103 inclusive, 6108-09, 6200-6203 inclusive, 6212-13, 6246-47, 6350 and 6351.

Single-pole, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog Nos. 6204-6207 inclusive.

Single-pole, 10 amperes, 250 volts, 20 amperes, 125 volts, catalog Nos. 6115-18 inclusive.

Double-pole, 5 amperes, 250 volts, catalog Nos. 6208-6211 inclusive, 6352 and 6353.

Double-pole, 10 amperes, 250 volts, catalog Nos. 6215-19 inclusive.

Double-pole, 20 amperes, 250 volts, catalog Nos. 6120-23 inclusive.

Three-way, 1 ampere, 250 volts, 3 amperes, 125 volts, catalog Nos. 6223, 6224, 6227-28.

Three-way, 3 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6225, 6226, 6354.

Three-way, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog Nos. 6229, 6230.

Four-way, 2 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6231 and 6232.

Two-circuit, 2 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6233-6236 inclusive.

Three-circuit, 2 amperes, 250 volts, 5 amperes, 125 volts, catalog Nos. 6237-6240 inclusive.

Also above types with lock attachments.

Listed July 13, 1915.

SWITCHES, Surface Snap.—The Bryant Electric Company, Bridgeport, Conn.

Bryant or Perkins. (With metal covers.)

Double-pole, 5 amperes, 250 volts, catalog Nos. 2617-18.

Three-point, 3 amperes, 125 volts, 1 ampere, 250 volts, catalog No. 2615.

Also above types with lock attachment.

Listed July 16, 1915.

WATER STERILIZER. — Electric Water Sterilizer Company, Scottdale, Pa.

This equipment comprises an electrode box containing metal plates, in connection with a direct-current circuit, between and around which the water passes; a coagulation chamber; two filter tanks and a water-controlled switch.

Catalog Nos. 0 to 4 inclusive.

Listed July 7, 1915.

WIRES, Miscellaneous.—General Electric Company, Schenectady, N. Y.

Varnished-cambric slow-burning wire, consisting of a No. 12 B. & S. gauge conductor covered with varnished cambric and having an outer braid painted with fire-resisting compound.

Standard for use only on low-potential instrument and pilot-light circuits on switchboards.

Listed July 8, 1915.

WIRES, Rubber-Covered.—Hardman Tire & Rubber Company, Belleville, N. J.

Marking: Three yellow threads woven parallel in braid..

Rubber-cobered wires shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters have labels attached.

Listed July 15, 1915.

Current Electrical News

ATLANTIC STATES.

PORTLAND, ME.—The Southwestern Ice and Power Company has been incorporated, to do a lighting, heat, ice and power business. John H. Pierce is president.

RANGLEY, ME. — The Oquossoc Light and Power Company has been incorporated with a capital stock of $50,000. The incorporators are F. B. Colby, F. S. McKenzie, J. A. Russell, R. H. Ellis.

RUTLAND, VT. — Arrangements have been made for the consolidation of the Hortonia Power Company, Rutland, and the Gaysville Electric Light and Power Company, of Bethel. It is understood that extensive reconstruction and new developments will be under way in the near future.

SHELBURNE FALLS, MASS.—The Power Construction Company, affiliated with the New England Power Company, has bought the plant and water power of the National Metal Edge Box Company at Readsboro, Vt., with a view to the further hydroelectric development of the Deerfield River. There are now five water generating stations on the Deerfield, which are operated by the New England Power Company. W.

BATAVIA, N. Y.—The City Council has decided to make arrangements for enlarging the electric light and power plant. Address Councilman Clough, chairman.

NEWARK, N. J.—The Board of Freeholders is arranging for an appropriation of $10,000 for additional electric lighting equipment at the county penitentiary. A.

BURLINGTON, N. J.—The Common Council has approved plans for the installation of an electrically-operated pumping plant for the water system, replacing the present steam-driven station. W. E. Temple, Philadelphia, is electrical engineer for the work A.

WINCHESTER, VA.—Julian F. Ward, mayor of Winchester, has requested the Common Council to investigate the matter of the city owning and operating its own electric lighting plant.

RALEIGH, N. C.—The city of Raleigh will install a white way system on eleven blocks in the business district, using seventy or eighty one-light standards. Address city electrician.

NORTH CENTRAL STATES.

BATAVIA, O.—The local municipal lighting plant will be abandoned, under a contract entered into by the village with the Cincinnati, Georgetown and Portsmouth Traction Company, which will sell current at wholesale to the village at three cents per kilowatt-hour, the rate charged to users being eight cents. The company will do some work in connection with the change. L.

HAMILTON, O.—New cluster street lights will be installed on the west side of town during the repair work on Main Street, in order to enable the installation of the conduits without tearing up the street. Contracts have not yet been let. L.

NORTHFIELD, O.—A municipal electric lighting plant will be built here. An election will be held September 20 to vote on the question of issuing $12,000 for the purpose of buying the necessary material.

URBANA, O.—The Federal Light and Power Company, of Boston, owners of the Urbana light plant are planning to spend $130,000 on their plant. Of this amount $18,000 will be spent in equipping the local station. Address W. P. Hurd.

HUNTINGTON, IND.—The light committee of the Commercial Association has made arrangements for the sale of $4,000 in city bonds and the city will advertise for bids on ornamental posts. The board will ask for bids on separate prices of the posts and for bids on the whole job.

SHOALS, IND.—It has been decided to erect a combined water and lighting plant, and contracts have been ordered prepared by the Town Council.

KANKAKEE, ILL.—Members of the board of supervisors are investigating the matter of installing an electric light plant to supply light to the court house and jail. Supervisors Parker, Taylor and Hennessy are members of the committee having the matter in charge.

OWOSSO, MICH.—The Owosso Improvement Association is behind a proposition to install a boulevard system of electric lighting.

SOUTH HAVEN, MICH.—Plans are being considered for the extension of the ornamental lighting system, now installed in the business district, to Monroe Park, on the north side of the city. The present posts in that section are iron, but estimates on concrete posts are being secured for the new system. Address mayor.

RICHMOND, WIS.—The village has voted to install an ornamental lighting system. Address mayor.

STURGEON BAY, WIS.—The sum of $6,000 in bonds was voted for electric lights, and for building a municipal plant. Address Board of Local Improvements.

HALLOCK, MINN.—An electric light system will be installed here. Address city clerk.

ARLINGTON, IOWA.—A franchise has been granted to C. Miller & Sons, of Clermont, for the construction and operation of an electric lighting plant.

CLARION, IOWA.—The Farmers' Mutual Light and Power Company, of Wright County has been organized with a capital stock of $10,000 by W. E. McGowan, president, John McCutcheon, Fritz Clausen and others, for the purpose of manufacturing power and light for the homes of the stockholders in Wright and Humboldt Counties.

IOWA FALLS, IOWA.—The Iowa Falls Heat, Light and Power Company has been sold to Dean Harland Smith and others.

MARATHON, IOWA.—An election will be held here sometime in September to vote on the question of bonding the town for $12,000 for the erection of a municipal lighting plant. Address city clerk.

GALLATIN, MO.—A meeting will be called by the business men of the city to decide the matter of a light and water plant. Address A. C. Stiles, consulting engineer, Kansas City, Mo.

JOPLIN, MO.—Proposed immediate extension of the power line of the Empire District Electric Company into the mining fields of southeastern Kansas will open opportunities for use of current by the industries and communities on the line. The extension will reach Baxter Springs, Kans., and southward. M.

MAGNET, NEB.—P. J. Sandberg is planning to purchase supplies and material for an electric and water plant.

ELDORADO, KANS.—Permission to construct an electric transmission line on the highways of Sedgwick county was granted the Kansas Gas and Electric Company by the county commissioners. The Eldorado Power plant was purchased recently by the Kansas Gas and Electric Company and it plans to furnish power and light for Eldorado through the line to be built across the two counties.

HUTCHINSON, KANS.—Plans are already under way for the erection of addition to electric light plant, another electric unit, combined generator and turbine for the already large plant of the United Water, Gas and Electric Company in this city. Address Manager J. F. Springfield.

NETAWAKA, KANS.—About $10,000 will be expended for municipal lighting. Address city clerk.

SOUTH CENTRAL STATES.

LANCASTER, KY.—A municipal electric lighting plant to cost $15,000 is contemplated by the city. The Mayor is directing the project.

JACKSONVILLE, ALA.—The Alabama Power Company has closed franchises and contracts for the lighting of Jacksonville, including the state normal school.

KUSA, OKLA.—Kusa Light and Power Company, has been granted a state

charter, with a capital stock of $10,000, with these incorporators: George E. Nicholson, Kansas City; Frank C. Nicholson, Iola, Kas., and John F. Goshorn, Henryetta, Okla. Kusa is a newly laid out townsite, a prospective industrial center.

MUSKOGEE, OKLA.—W. J. Cook and Homer Needles, of Muskogee, have submitted to the city a proposition for erecting a dam and power plant in the Illinois River at a point 28 miles east of Muskogee where it is claimed 5,000 horsepower can be generated at a cost of $250,000.

STRANG, OKLA.—The Grand River Power and Electric Company, of which H. C. Holderman, Strang, Okla., is president, has submitted a proposition to New York financiers to build and equip a hydroelectric plant with a dam across the Grand River at a point between Strang and Adair, Okla., 75 miles from Muskogee, to furnish cities in the State with power. It is estimated that 20,000 horsepower can be generated by a $1,000,000 plant. The cost of transmission to consuming points would be in addition to the primary cost of dam and plant.

WIRT, OKLA.—W. E. Gupton has about completed arrangements for installing an electric lighting plant in this city.

DEVINE, TEX.—The Devine Light, Power and Ice Company, which was recently organized here with a capital stock of $35,000, will build an electric light and power plant. J. W. Fullerton is interested. D.

SPUR, TEX.—The Citizens' Gin and Power Company will build an electric light plant here. C. D. Copeland is interested. D.

WESTERN STATES.

GREAT FALLS, MONT.—According to reports the City Council recently adopted a resolution creating a lighting district, which comprises Third and Fourth Avenues North, wherein an up-to-date lighting system will be placed at an early date. O.

HYSHAM, MONT.—The Town Council recently retained the Billings Engineering and Contracting Company, of Billings, Mont., as consulting engineers for the laying out and construction of a complete lighting system. According to the reports, plans will be prepared at once, and the work of installation rushed to an early completion. O.

LIBBY, MONT.—It is reported that Kirby & Reynolds, of Sheridan, Mont., owners of the Libby Electric Light and Water Company, will make extensive improvements to the local establishment and distribution system at an early date. O.

POLSON, MONT. — A municipal electric light plant will be installed in this city. Address the city clerk.

ROUNDUP, MONT.—According to officials of the Roundup Coal Mining Company, here, which owns and operates the local light and power plant, a new 200-kilowatt, 2300-volt lighting generator, and two additional boilers, to supply steam for the generator, will immediately be installed in the local plant. It is also reported that the City Council will install a new lighting system, and that the Roundup Coal Mining Company will supply current for the new system. O.

ALBION, IDAHO.—On August 23, this city will vote on the proposition of issuing bonds in the sum of $8,000, for the purpose of constructing a municipal power plant and electric lighting system. Andrew Lounsbury is chairman of the village board.

ST. ANTHONY, IDAHO.—It was erroneously reported in the issue of July 31, that the city was considering the construction of a municipal lighting plant. The facts in the case are that the council at a meeting in June instructed the city attorney to confer with the Utah Power and Light Company, which operates the St. Anthony water works system in connection with the lighting and power business, regarding the possible acquisition by the municipality of the water works system. There has been no talk of construction of a municipal lighting plant, nor has a committee been appointed to confer with the company regarding the purchase of the lighting plant. No extensions will be made to the lighting plant, nor additions to the distributing system made by the municipality.

HOLBROOK, ARIZ.—T. M. Quebedeaux and K. H. Meyers have been granted a light and power franchise.

PHOENIX, ARIZ.—Plans and estimates for a new electrical district, north and east of this city, prepared by Engineer Elliott, have been approved by the county board of supervisors, and action will be taken to call a bond election. The proposed system calls for 75 miles of line.

GLENDALE, CAL.—The board of trustees has adopted a resolution ordering the installation of appliances for electric lighting on Brand Avenue, from First Street to the northerly boundary line of Glendale.

REDWOOD CITY, CAL.—The city trustees have under consideration a proposed system of electroliers for the principal streets of the city.

RIVERSIDE, CAL.—In compliance with a petition received from the residents of Coachella, the board of supervisors has called an election for September 4, to vote on the formation of a lighting district.

WILLIAMS, CAL.—The citizens of Arbuckle at a recent election voted to organize a lighting district.

CANYON CITY, ORE.—The Prairie City Light and Power Company, of Prairie City, according to R. C. Reece, will extend its power transmission lines into the John Doe Valley, to furnish current for dredging operations, which are in progress there. The new business obtained by the company necessitate the construction of an 800 horsepower plant, which will furnish light and power in the valley.

COLFAX, WASH.—September 2 has been set by Whitman County Commissioners as a date for hearing on the application of the Steptoe Light and Power Company for a franchise to construct, maintain and operate transmission lines for electric lighting and power purposes in the town of Steptoe. The application for the franchise was filed by E. N. Woodin, of Colfax, and covers a period of fifty years. O.

OLYMPIA, WASH.—The Council, it is reported, has about decided to grant an electric lighting franchise to Wilbur B. Foshay, of Portland, Ore., giving him a contract for supplying current for street lighting, and to operate pumps of the water department. The franchise under consideration also proposes to give the right to sell electric current in the down-town districts, and in the residence districts, where the proposed pole lines, carrying the power from the generating plant to the substation, will extend. The franchise provides that the city of Olympia can take over the properties after a stipulated period, which will give the investors a chance to realize on their investment. The only restriction is that the city must be supplied with current first. This field is now covered by the Olympia Light and Power Company. O.

SEATTLE, WASH. — The City Council, H. W. Carroll, clerk, has been asked by the secretary of the Building Owners and Managers' Association, to provide in the 1916 budget for placing wires, carrying electrical current, owned, operated and maintained by Seattle municipal lighting plant, underground. The competing corporation, the Puget Sound Traction, Light and Power Company, has complied with this ordinance, and the city of Seattle, no doubt, will also follow this example.

TACOMA, WASH. — A resolution calling for the installation on South E Street, from Fourth Street to Twenty-seventh Street, of an ornamental lighting system, specifying four iron standards at street intersections of the streets, to be included in the Lighting District, has been adopted by the City Council. O.

NEW INCORPORATIONS.

SYRACUSE, N. Y.—The Mohawk Electrical Supply Company increases its capital from $25,000 to $50,000. All new capital has been subscribed for and paid in.

PHOENIX, ARIZ.—The Grand Canyon Power and Development Company has been incorporated with a capital stock of $150,000, by James R. Girard and Pamelia B. Girard.

KUSA, OKLA.—The Kusa Water and Light Company has been incorporated with a capital stock of $10,000, by George E. Nicholson, John S. Goshorn and Frank C. Nicholson.

ANNISTON, ALA.—The Jacksonville Light and Power Company has been organized by Thomas W. Martin, of Birmingham, W. R. Lloyd and Wiley Alford. The company is capitalized at $10,000.

CLEVELAND, O.—The Balzer Electric Company has been incorporated with a capital of $30,000. The incorporators are J. Balzer, Harvey A. Balzer, David Eleiss, Charles D. Curr and Mayme Dewitt.

SAN FRANCISCO, CAL.—Articles of incorporation have been filed here for the Jensen-Pridham Electric Company of California, with a capital stock of $1,500,000, by P. L. Jensen, E. S. Pridham, W. A. Breen and Thomas Martin.

EVANSVILLE, IND.—The Electric Testing and Engineering Company has been established to deal in electrical appliances and supplies. The company is capitalized at $10,000. Incor-

porators: R. R. Winklepleck and C. W. Wolfe, of Evansville; C. W. Schlemmer, of Cannelton, and G. H. Hauser, of Indianapolis.

FINANCIAL NOTES.

The reorganization plan of the Kansas City Railway and Light Company and its subsidiaries, the Metropolitan Street Railway and the Kansas City Electric Light Company, has been completed. A meeting, at which all of the parties interested in the reorganization were represented, was held in Chicago, and the new plan is now awaiting approval by the Federal Court at Kansas City. An allowance of $28,700,000 for indebtedness is provided for in the plan, to be borne by two new companies, one taking over the street railway lines and the other the lighting properties. About $5,000,000 of this indebtedness will be taken care of by the lighting properties, and an issue of approximately $8,000,000 5.5 per cent three-year notes, an open first five-per-cent mortgage under which $10,000,000 bonds shall be issued, and $5,700,000 bonds under a second mortgage, will be made by the railway company. The plan also provides for a board of readjustment managers, composed of Kuhn, Loeb & Company, Blair & Company, Lee, Higginson & Company. H. L. Stewart and N. W. Halsey & Company.

Dividends.

	Term.	Rate.	Payable.
American Rys.	Q	1 %	Sept. 10
American Pr. & Lt. com.	Q	1 %	Sept. 1
Blackstone Val. Gas & Elec. com.	Q	$2	Sept. 1
Cent. Ark. Ry. & Lt. Corp. pf.	Q	1.75%	Sept. 1
Con. Gas, Elec. Lt. & Pr., Balt.	Q	1.75%	Oct. 1
Con. Gas, Elec. Lt. & Pr., Balt. pf.	S	3 %	Oct. 1
Middle West Utilities pf.	Q	1.5 %	Sept. 1
North. Tex. Elec. com.	Q	$1	Sept. 1
North. Tex. Elec. pf.	Q	$3	Sept. 1
Phila. Elec.	—	1.75%	Sept. 15

Reports of Earnings.

INTERNATIONAL TRACTION.

International Traction Company reports earnings for the 12 months ended June 30, 1915, as follows:

	1915	1914
Gross earnings	$6,748,779	$6,820,349
Net after taxes	2,813,051	2,669,537
Balance after charges	969,230	892,341
Preferred dividends	200,000	200,000
Renewed reserve	320,441	271,771
Surplus	448,789	420,570

HAVANA ELECTRIC RAILWAY, LIGHT & POWER.

Six months ended June 30:

	1915	1914
Gross earnings	$2,751,375	$2,675,456
Net	1,019,644	791,152

KEYSTONE TELEPHONE.

	1915	1914
July gross	$114,204	$111,467
Net	55,564	54,938
Surplus	28,624	28,707
Seven months' gross	784,825	767,715
Net	394,778	387,871
Surplus	209,174	206,056

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

No. 17,819. TELEPHONE SYSTEM.—An American consular officer in the Far East has transmitted a report, together with blue prints, specifications, etc., relative to an opportunity for the installation and supply of equipments for a telephone system. A copy of the report may be had on application, and the blue prints, etc., may be examined.

No. 17,821. ELECTRIC FANS.—An American consular officer in India reports that an electrical engineer in his district desires to be placed in communication with an American manufacturer of electrical goods used in hotels and office buildings, particularly electric fans. The man is about to furnish the electrical equipment for a large hotel, and also desires to submit bids for other buildings. Catalogs and full information should be sent at once. The man is willing to pay cash against documents in foreign country. Correspondence may be in English.

No. 17,863. ELECTRICAL SUPPLIES.—A represenative of a Norwegian firm, who is at present in New York City, states that he desires to establish commercial relations with American manufacturers and exporters of pocket flashlights, electric push buttons, etc. Cash will be paid against shipping documents in New York.

No. 17,877.—ELECTRICAL SUPPLIES.—An American consular officer in Siberia reports that a firm in his district desires to communicate with American manufacturers of electric lamps, chandeliers, and electrical appliances of all kinds. Catalogs, with prices, should be forwarded at once. Shipping weights, freight rates, etc., should be indicated. Correspondence should be in Russian or German.

No. 17,898. ELECTRIC MOTORS.—A merchant in Spain informs an American consular officer that he desires to receive catalogs and full information relative to stationary electric motors for pumping water. The merchant states that he has been accustomed to credit terms of 30, 60, or 90 days. Correspondence, etc., should be in Spanish.

NO. 17,964. ELECTRICAL AND OPTICAL GOODS.—A merchant in the Netherlands informs an American consular office that he desires to purchase electrical and optical goods, electric pocket lamps, etc. A credit term of three months, or 30 days with two per cent discount, is desired.

NO. 17,936. ELECTRIC MOTORS.—A business man in France writes an American consular officer that he desires to represent American manufacturers of electric motors of from 2 to 15 horsepower capacity for agricultural purposes.

PROPOSALS.

ELECTRICAL EQUIPMENT.—Sealed proposals will be received at the office of the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until August 31, 1915, for furnishing miscellaneous globes; miscellaneous prismatic reflectors, as per Schedule 8671; miscellaneous W. T. attachment plugs; miscellaneous tips for W. T. attachment plugs, as per Schedule 8670; miscellaneous weatherproof sockets, as per Schedule 8669; miscellaneous cotton insulating tape; miscellaneous rubber insulating tape, as per Schedule 8672, all for delivery at Navy Yards, east and west.

PERSONAL MENTION.

MR. SAMUEL W. M'ELROY, Pompton Lakes, N. J., has recently been appoinetd city electrician by the local council. A.

MR. J. L. WHITE, manager of the Oregon Power Company at Albany, Ore., has been elected vice-president of the Albany Merchants Association.

MR. E. Y. STIMPSON, 650 Beacon Street, Boston, Mass., has been given the New England agency for the Detroit Electric, the Anderson Electric Car Company, of Detroit, having given up its salesrooms at 903 Beacon Street.

MR. W. S. JAMES, formerly with the Woolley-James Electric Company, Buffalo, N. Y., has severed his connection with the company and will hereafter be connected with the sales department of the Rochester Electric Supply Company, Rochester, N. Y.

MR. RUSSELL N. EDWARDS, a graduate of Purdue University, with a wide experience in mechanical and electrical engineering, has joined the organization of the Russell M. Seeds Company, of Indianapolis, Ind., a large and successful advertising agency handling a number of technical accounts.

MR. C. C. CHILDERS, president of the Childers and Waters Electric Company, and president also of the Louisville Builders' Exchange, is at the head of a committee of that organization which is preparing for the annual outing. This will be held on Labor Day, September 6, at Hike's Point, a locally popular resort.

MR. THOMAS F. KELLY, commercial manager of the Dayton Power and Light Company, Dayton, O., has been appointed by President E. W. Lloyd and the directors of the National Electric Light Association, State Chairman of the Membership Committee for Ohio, and a member of the Company Sections Committee of the Association for the ensuing year.

MR. FRED M. LEGE, JR., who has been general manager of the Brush Electric Company and the Galveston Gas Company, has resigned his position with the former company but will remain in charge of the gas company, which was recently purchased by Electric Bond and Share interests. Mr. Lege also will have a prominent place in the operating organization of the Electric Bond and Share Texas properties. M. R. Phipps has been appointed general manager of Brush Electric.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Aug. 16	Aug. 9
American Tel. & Tel. (New York)	122¾	122⅛
Commonwealth Edison (Chicago)	135	133½
Edison Electric Illuminating (Boston)	233	231
Electric Storage Battery common (Philadelphia)	62½	65¾
Electric Storage Battery preferred (Philadelphia)	62½	65¾
General Electric (New York)	171	171
Kings County Electric (New York)	119	119
Massachusetts Electric common (Boston)	4½	4⅞
Massachusetts Electric preferred (Boston)	33¼	34
National Carbon common (Chicago)	145	147
National Carbon preferred (Chicago)	119¾	119½
New England Telephone (Boston)	132	131
Philadelphia Electric (Philadelphia)	24¼	23⅞
Postal Telegraph and Cables common (New York)	76½	76½
Postal Telegraph and Cables preferred (New York)	66¾	66
Western Union (New York)	71	70⅝
Westinghouse common (New York)	112⅝	112¼
Westinghouse preferred (New York)	137½	131

MR. THOMAS B. SMITH, of Philadelphia, has been appointed to the Pennsylvania Public Service Commission by Governor Brumbaugh, taking the place of Congressman Keiss, who did not accept the appointment offered by the governor. Mr. Smith was born in Philadelphia in 1869, and was postmaster there during the administration of President Taft. He served in the Philadelphia Common Council and was elected for two terms in the legislature.

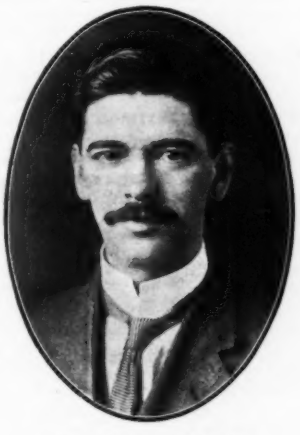
MR. D. C. TRACEY has been appointed supervisor of electric welding of the Baltimore & Ohio Railroad, with jurisdiction over this work at all shops of the system. It is believed that Mr. Tracey is one of the youngest men ever appointed to an official position on an American railroad. He is in his early twenties, has spent practically all of his working life with the Baltimore & Ohio, was educated in the night schools of that system, and developed himself through presistent application to his duties in the several apprentice courses and shops of the railroad organization. The appointment reflects credit upon the man and the system.

MR. ARTHUR M. TORREY, for the past four years in charge of the soliciting department of Hildreth and Company, recently resigned that position to take charge of the engineering contract department of W. S. Barstow and Company, 50 Pine Street, New York. This concern is engaged in engineering and construction work in various parts of the country and also controls the General Gas and the Eastern Power and Light corporations, operating some forty public utilities in the eastern and middle western states.

PROF. WILLIAM S. FRANKLIN has resigned as professor of physics at Lehigh University, where he has been for 18 years, first as professor of physics and electrical engineering and latterly as professor of physics, the two chairs having been separated in 1903. From 1892 to 1897 Dr. Franklin held a similar position at Iowa State College. He is a fellow of the American Institute of Electrical Engineers and the author of a number of textbooks which have attracted considerable attention on account of their original treatment of physics and mathematics and the attempt to give these subjects a human interest.

MR. HERBERT A. DALLAS has been appointed clerk of the State Board of Examiners of Electricians of Massachusetts for a three-year term at a salary of $2,000 per annum. Mr. Dallas has for the past nine years been assistant electrical engineer and inspector on electrical construction for the Schoolhouse Department of the City of Boston. He was in charge of laying out all electrical construction in new school buildings and had the care of the installations in existing buildings. He was born in Boston in 1878, was educated in the public schools and at the Evening High School and the Franklin Institute. He worked for the Public Buildings Department as a maintenance man prior to taking the position with the School Department. His home is in the Roxbury district.

PROF. ALEXANDER GRAY, of McGill University, Montreal, has been appointed professor of electrical engineering in Sibley College, Cornell University. Professor Gray will also be the head of the electrical department, filling the vacancy made by the resignation of Prof. H. H. Norris, who resigned from the position to engage in editorial work. Professor Gray will take up his new duties at Cornell in September. Prof. Alexander Gray was born in Edinburgh, Scotland, of a well known family of engineers. When fifteen years of age he commenced to serve his apprenticeship and worked for seven years at the lathe, bench and drafting board. During this time he attended evening classes and, later, the engineering classes of Edinburgh University, from which he graduated in civil and mechanical engineering in 1903. At this time he was awarded a Whitworth scholarship which enabled him to spend two years at McGill University, Montreal, where he studied electrical engineering. After graduation from McGill University, Professor Gray joined the engineering staff of the Bullock Electric Company, of Norwood, Ohio, and later the staff of the Allis-Chalmers Company, of Milwaukee, Wis., with which companies he remained for five years. During this time he gained wide experience in the



Prof. Alexander Gray.

design, construction and operation of all types of electrical machinery. In 1910 he accepted an appointment as assistant professor at McGill University, which position he has held for the last five years. Professor Gray has been granted a considerable number of patents for electrical apparatus. He has also contributed largely to the literature of his subject, his two recent books, namely, "Electrical Machine Design," and "Principles and Practice of Electrical Engineering," have been widely adopted as university texts and are favorably known to the profession.

MR. RAY PALMER, formerly commissioner of gas and electricity of the City of Chicago, announces that he has resumed his consulting engineering practice and is prepared to advise about or undertake general supervision of organization, valuation, rates, lighting and other public utility or industrial problems requiring expert engineering and accounting service. Mr. Palmer's offices are located in the Hartford Building, Suite 714, Chicago, Ill. Mr. Palmer, during his term as commissioner for the City of Chicago, rendered a highly satisfactory service to the municipality. He carried forward a great many improvements and placed the electrical department in a splendid position as regards efficiency and economy of operation. The last report of the Department of Gas and Electricity is a classic for its completeness and for the valuable data regarding the operation of a municipal lighting department. Mr. Palmer is a careful student of civic affairs, equipped with a fine education and a wealth of experience. His very pleasant personality attracted many friends to him, and he is without doubt one of the most popular and satisfactory officials the city has ever engaged. Just prior to his departure from his work as commissioner, Mr. Palmer was tendered a banquet and presented with many tokens of esteem by his associates in the department.

OBITUARY.

PROF. THOMAS BLISS STILLMAN, a well known chemical engineer, died of heart disease after a brief illness at his home in Jersey City, N. J., on August 10, aged 64. He was a writer of considerable note and for years a professor at Stevens Institute of Technology.

DATES AHEAD.

International Association of Municipal Electricians. Annual meeting. Gibson Hotel, Cincinnati, O., August 24-27. Secretary, C. R. George, Houston, Tex.

American Institute of Chemical Engineers. Seventh semi-annual meeting, San Francisco, Cal., August 25-28. Secretary, J. C. Olsen, Cooper Union, New York, N. Y.

Indiana Electric Light Association, Annual convention, Hotel Deming, Terre Haute, Ind., September 8-10. Secretary, T. Donahue, La Fayette, Ind.

Pennsylvania Electric Association. Annual convention, Bedford Springs, Pa., September 8-10. Secretary, H. N. Mueller, 435 Sixth Avenue, Pittsburgh, Pa.

Association of Iron and Steel Electrical Engineers. Annual convention, Hotel Statler, Detroit, Mich., September 8-11. Secretary, W. T. Snyder, McKeesport, Pa.

Northwest Section, National Electric Light Association. Annual convention, Portland, Ore., September 8-11. Secretary, N. W. Brockett, Pioneer Building, Seattle, Wash.

Association of Edison Illuminating Companies. Annual convention, Spring Lake, N. J., September 13-16. Secretary, George C. Holberton, San Francisco, Cal.

Electrical Supply Jobbers' Association. Quarterly meeting, Clifton Hotel, Niagara Falls, Ont., September 14-16. Secretary, Franklin Overbagh, 411 South Clinton Street, Chicago, Ill.

New England Section, National Electric Light Association. Annual convention, Mt. Kineo House, Kineo, Me., September 14-17. Secretary, O. A. Bursiel, 149 Tremont Street, Boston, Mass.

American Institute of Electrical Engineers. Panama-Pacific convention, San Francisco, Cal., September 16-18. Secretary, F. L. Hutchinson, 33 West Thirty-ninth Street, New York, N. Y.

American Electrochemical Society. Twenty-eighth general meeting, San Francisco, Cal., September 16-18. Secretary, Joseph W. Richards, South Bethlehem, Pa.

International Engineering Congress, San Francisco, Cal., September 20-25. Executive Secretary, E. J. Duprey, Fox-

croft Building, San Francisco, Cal.

American Mining Congress. Eighteenth annual convention. San Francisco, Cal., September 20-22. Secretary, J. F. Callbreath, Munsey Building, Washington, D. C.

Illuminating Engineering Society. Annual convention, New Willard Hotel, Washington, D. C., September 20-23. Assistant secretary, Joseph Langan, 29 West Thirty-ninth Street, New York, N. Y.

Telephone Pioneers of America. Annual meeting, San Francisco, Cal., September 21-23. Secretary, R. H. Starrett, 15 Dey Street, New York, N. Y.

Southeastern Section, National Electric Light Association. Annual convention, Grove Park Inn, Asheville, N. C., September 22-24. Secretary, George H. Wygant, Tampa, Fla.

Colorado Electric Light, Power and Railway Association. Thirteenth annual convention, Glenwood Springs, Colo., September 23-25. Secretary, Thomas F. Kennedy, 900 Fifteenth Street, Denver, Colo.

American Electric Railway Association. Annual convention, San Francisco, Cal., October 4-8. Secretary, E. B. Burritt, 8 West Fortieth Street, New York, N. Y.

Jovian Order. Thirteenth annual convention, Hotel Sherman, Chicago, Ill., October 13-15. Mercury, Ell C. Bennett, Syndicate Trust Building, St. Louis, Mo.

Electric Vehicle Association of America. Annual convention, Cleveland, O., October 18-20. Executive secretary, A. J. Marshall, 29 West Thirty-ninth Street, New York, N. Y.

With the Electrical Manufacturers

The Electric Machinery Company, Minneapolis, Minn., is again working its force full time and reports the business outlook for the fall encouraging.

The P. & B. Manufacturing Company, Milwaukee, Wis., has increased its capital stock from $5,000 to $25,000, and has moved its factory to larger quarters at 189 Fifth Street.

Robbins & Myers Company, Springfield, O., has issued a folder entitled "The Unusual Performance of an Unusual Motor." This refers to the type K induction motor, which is put out in sizes ranging from 0.25 to 20 horsepower inclusive.

The Delta-Star Electric Company, Chicago, Ill., is distributing descriptive leaflet No. 750, showing typical installations of high-tension air-break switches of various commercial voltages up to 66,000. Copies of this circular will be sent upon request to those interested.

The Mutual Electric and Machine Company announces that it has moved its main office and factory from Wheeling, W. Va., and that hereafter all mail should be addressed to West Fort Street and Fourth Avenue, Detroit, Mich. The new telephone number is Cadillac 2512.

Carbo Steel Post Company, Rand McNally Building, Chicago, Ill., has issued a booklet describing its steel poles and their advantages as compared with wood and concrete poles. The flexible type of pole is given special attention and cost data are given to prove its economy. Ornamental street-lighting posts are also included.

Fargo Manufacturing Company, Incorporated, Poughkeepsie, N. Y., has issued a revised edition of Bulletin No. 402 describing superior wiring devices manufactured by this company. These include various types of connectors, cable lugs and grounding devices. Copies will be sent to those interested upon request.

The Cutler-Hammer Manufacturing Company, Milwaukee, Wis., is distributing a well illustrated 16-page booklet issued by the Mergenthaler Linotype Company, of New York, devoted to the construction, application and operation of the Cutler-Hammer electrically-heated linotype pot. Copies of this booklet will be furnished to those interested upon request.

The Smith-Brown Battery Works, of Bloomington, Ind., has been purchased by Carl Fisher and F. R. Allison, of the Indianapolis Prest-O-Lite Company, who will remove the plant to Indianapolis. Prof. O. W. Brown, of the chemical department, of Indiana University, Bloomington, and inventor of the Brown system of batteries, has been engaged at a salary to go to Indianapolis and head the company.

Stow Manufacturing Company, Binghamton, N. Y., has issued a circular calling attention to some of the portable tools made by that company, which are driven by electric motors connected by flexible shaft to the cutting tool. These include various types of drills and grinders, a hand buffer, motor-driven screw drivers, etc. There is also a general utility tool for miscellaneous use.

The Hartford Machine Screw Company, Hartford, Conn., announces that the extensive additions to its mammoth plant at Hartford are rapidly nearing completion. In addition to housing the new general offices of the company, the designs for furnishing of which contemplate the most modern and approved equipment and efficient devices, the new building will afford space for extensive additions to the manufacturing facilities of the plant.

Bodine Electric Company, 2254 West Ohio Street, Chicago, Ill., has issued Bulletin No. 520, describing its interchangeable motors for both alternating and direct current. Both types in sizes from 0.1 to 0.25 horsepower have the same outside dimensions and speed ratings. The alternating-current motors are of the squirrel-cage type. They are self-starting under full load and are provided with a centrifugal switch which disconnects the starting winding after the rotor has reached rated speed. The direct-current motors have armatures of the slotted drum type and two field poles. The armatures are wound with double-silk-covered magnet wire. The bulletin gives full data.

Sangamo Electric Company, Springfield, Ill., has issued Bulletins Nos. 41 and 42. The former describes meters for electric railway service and points out the advantages of equipping railway cars with these Economy meters. Examples of operating results with their use are given. The second bulletin deals with the switchboard type of meter and gives illustrated descriptions of both watt-hour and ampere-hour instruments. The constructional advantages of these meters are pointed out and diagrams given for proper connection with transformers and shunts.

The Globe Stove & Range Company, Kokomo, Ind., has published a handsome catalog designated as No. 37, illustrating and describing electric ranges, ovens, hot plates, cooking devices and their accessories. The general descriptive matter gives in elaborate detail, with many illustrations, complete information with regard to mechanical and electrical characteristics of the heating elements. The balance of the catalog is replete with large-sized, well executed reproductions of the apparatus, together with descriptive matter and prices. Copies of this catalog will be furnished to those interested upon request.

The Boustead Electric and Manufacturing Company, Minneapolis, Minn., of which James T. Boustead is president, recently rented the store and basement adjoining its premises in order to take care of its increasing business. In addition to its other electrical business the company handles second-hand electrical machinery and has just purchased 53 motors and generators, ranging from one to fifty kilowatts, from the Pillsbury-Washburn Flour Mills Company, which is changing its equipment from direct to alternating current. The Boustead Company will mail a list of its second-hand machinery to those interested upon request.

The Electric Supply Company, Memphis, Tenn., has ready for distribution catalog No. 5. This is devoted to a comprehnsive illustrated list, with prices complete, of electrical supplies. This company has a well established reputation for handling only superior lines. It is the territorial agent for the Phillips Insulated Wire Company, General Electric Company, National Carbon Company, National India Rubber Company, American Electric Telephone Company, Fort Wayne Electric Works, Indiana Steel

and Wire Company, the Faries Manufacturing Company, DeVeau Telephone Manufacturing Company and American Ever Ready Company. The company's new building, one of the best equipped and most modern electrical supply establishments in the south, is located in the heart of the business district of Memphis. The entire resources of the organization are devoted to serving its chosen territory to best advantage. It does no contracting or retail business, and confines itself to the wholesale distribution of specialties of an electrical nature.

The Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has printed a series of attractive four-color poster stamps, which feature the C-H push-button, 660-watt, brass-shell and porcelain sockets, and the porcelain pendant switch. A circular on the C-H push-button, 660-watt socket (pendant type) is being distributed to the electrical trade. This circular points out that the new section added to Rule 31 of the National Electrical Code requires sockets with three-eighths inch cap when not attached to a fixture and that they must be provided with an approved insulating bushing. The fact that three-eighths inch sockets are listed six cents higher than the C-H pendant-type socket is mentioned as another argument for the use of this socket for pendant work. The other features, such as the approved easily wired cord-strain relief and the high capacity of 660 watts are also mentioned. The new Cutler-Hammer phase-failure and phase-reversal protective device developed by Cutler-Hammer engineers is described in an 8.5-by-11-inch circular. Attention is directed to the ever present chance of burning out polyphase motors because of blowing of one fuse, and to the liability of serious accidents due to polyphase motors starting up in the wrong direction of rotation because of reversal of the phases. The protection provided by the new device is outlined, the construction is explained and the features of smallness and compactness are pointed out as being of considerable importance.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued leaflet No. 3566 describing its line of oil-immersed water-cooled transformers. When desired these transformers are supplied with a base fitted with wheels to facilitate handling. The cooling coils are arranged along the sides of the tank and are suspended from the cover and can be removed with it from the tank when necessary. Both shell-type and core-type transformers are built for water cooling in any capacity above 200 kilowatts. They are constructed for either single-phase or three-phase circuits at any commercial voltage and frequency. The Westinghouse Company announces the receipt of the following orders: The Western States Gas & Electric Company, Placerville, Cal., one 1,875-kilowatt, 2,300-volt, three-phase, 60-cycle water-wheel generator for an extension to present plant; Union Light, Heat & Power Company, Fargo, N. D., two 1,875-kilovolt-ampere, 2,300-volt turbo-generator units; Consolidated Gas, Electric Light & Power Company, Baltimore, Md., one 6,825-kilovolt-ampere 375-revolutions per minute synchronous frequency-changer set; Citizens' Light, Heat & Power Company, Johnstown, Pa., one 6,250-kilovolt-ampere, 4,000-volt, 60-cycle turbine unit with necessary auxiliary equipment.

Record of Electrical Patents

Issued by the United States Patent Office, August 10, 1915.

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,149,171. **Insulating Varnish.** C. Baeder, Hoboken, N. J. Compound of resinous base, linseed oil, rubber, sulfur and oxygen compound of manganese, having low conductivity when dry.

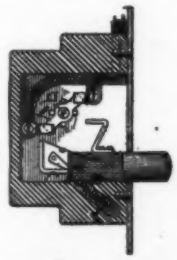
1,149,172. **Electric Flat-Iron.** H. P. Ball, assignor to General Electric Co., Schenectady, N. Y. Flat, reflexed heating unit cast in body portion.

1,149,173. **Resistance Element.** H. P. Ball, assignor to General Electric Co. Schenectady, N. Y. Insulated resistance enclosed in heat conductive sheath.

1,149,188. **Incandescent Lamp.** F. Dickenshied, assignor to General Electric Co. Metallic filament flattened at point of support to increase radiation.

1,149,199. **Tampering-Preventing Device for Fire-Alarm Boxes.** J. Karely, Chicago, Ill. Special structure to prevent unauthorized operation.

1,149,203. **Electric Furnace.** J. G. Marshall, assignor to Union Carbide Co., New



No. 1,149,362.—Wall Switch.

York, N. Y. Carbide furnace has a hearth and a spout of chilled carbide.

1,149,206. **Elevator-Driving Mechanism.** B. F. Mechling, Jr., assignor to Albro-Flem Elevator Co., Philadelphia, Pa. Mounting and gearing of motor.

1,149,207. **Automatic Switch-Controlling Means.** W. S. Menden, assignor to Megosin Co., Inc., Brooklyn, N. Y. Structural details of a rotary circuit make-and-break device making and breaking circuit a number of times in a revolution.

1,149,208. **Glass Structure.** O. A. Mygat, assignor to Holophane Glass Co., New York, N. Y. Configuration of glass inclosure for light.

1,149,210. **Electrolytic Cell.** H. R. Nelson, Elizabeth, N. J. U-shaped, permeable cathode in a container to which steam is introduced and liquid cathode product is collected in chamber insulated from cathode.

1,149,211. **Method of Electrolysis.** H. R. Nelson. For electrolyzing solutions of salts of alkali and alkali earth metals.

1,149,229. **Telephone System.** R. I. Utter, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Arrangement of link circuit.

1,149,233. **Process of Recovering High-Grade Phosphoric Acid.** F. S. Washburn, Nashville, Tenn. Fume for further treatment is produced by submitting phosphate rock and silica to action of electric furnace.

1,149,237. **Reflector.** C. W. White, North Bennington, Vt. Guard at edge of reflector out of path of reflected light.

1,149,238. **Electric-Furnace Regulator.** R. H. White, assignor to Norton Co., Worcester, Mass. Has motor-moved electrode, the circuit of the motor being automatically controlled according to the position of the electrode.

1,149,245. **Vehicle Signal Apparatus.** B. L. Bobroff, Milwaukee, Wis. Automobile direction indicator; each signal arm carries electric lamp connected in circuit when arm is operated.

1,149,254. **Apparatus for Producing Ozone and Separating Gases.** H. Dumars, Glen Ridge, N. J. Air below liquefying temperature of ozone is flowed through electrical effluence device and liquid ozone and nitrogen gas separately collected.

1,149,256. **Bottle-Filling Device.** J. H. Godfrey, Chicago, Ill. Electromagnet opens valve controlling supply when bottle placed in position and permits valve to close when bottle is full.

1,149,275. **Electromagnet.** J. F. McElroy; S. H. McElroy, Execx., assignor to Consolidated Car-Heating Co., Albany, N. Y. Particular structure and arrangement of frame and plunger.

1,149,282. **Insulator-Supporting Fixture.** C. L. Beirce, Jr., Pittsburgh, Pa. Bracket for pole attachment.

1,149,312. **Switch Movement.** B. C. Webster, assignor to Harvey Hubbell, Inc., Bridgeport, Conn. Rotary, snap switch.

1,149,315. **Electric Switch.** C. J. Zigler and W. P. Holden, Chicago, Ill. Arrangement of contacts, insulating partitions, etc., in oscillating switch which gravity and spring tend to open but which may be locked closed.

1,149,325. **Electric Switch.** T. E. Barnum, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Fluid-pressure operated, quick break switch.

1,149,358. **Egg-Tester.** W. E. Frost, assignor of one-third each to A. C. Leveque and J. P. Chevalier, Lewiston, Me. Particular structure and mounting of light receptacle.

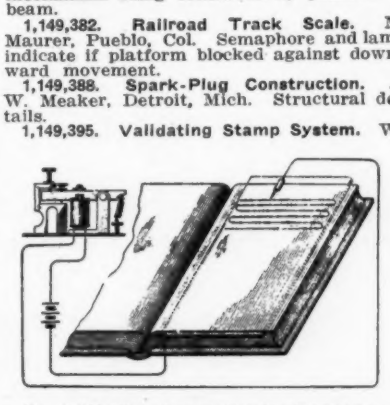
1,149,362. **Wall Switch.** D. D. Gordon, assignor to Yost Electric Mfg. Co., Toledo, O. Push gives snap action to oscillating contact member. (See cut.)

1,149,378. **Automatic Recording Scale.** E. McGarvey, assignor to International Electric Co., Bellefonte, Pa. Poise screw controlling type wheels driven from electric motor through magnetic clutch, printing mechanism being controlled by position of beam.

1,149,382. **Railroad Track Scale.** M. Maurer, Pueblo, Col. Semaphore and lamp indicate if platform blocked against downward movement.

1,149,388. **Spark-Plug Construction.** J. W. Meaker, Detroit, Mich. Structural details.

1,149,395. **Validating Stamp System.** W.



No. 1,149,547.—Apparatus for Enabling Blind to Read.

H. Muzzy, assignor to National Cash Register Co., Dayton, O. Validating mechanisms at sub-station are selectively controlled from central station.

1,149,409. **Quick-Break Electric Switch.** E. Schwartz, assignor to Pelouze Mfg. Co., Chicago, Ill. Plug is spring gripped to hold it in circuit breaking and closing positions respectively and snap action is produced.

1,149,418. **Signalling System.** H. B. Stone, Providence, R. I. Local circuit controlling line circuit and controlled by polarized relay in key-controlled alternating current circuit, has special arrangement of contacts and condensers.

1,149,428. **Telegraphy.** P. B. Delany, assignor to Delany Telegraphic Transmitter Co., New York, N. Y. Successive impulses of dot and dash system automatically sent alternately over two lines and receiver manifests them in orderly sequence.

1,149,437. **Terminal for Electric Wires.** V. C. H. Gibson, Camden Town, England. Structure adapted for connection of flexible conductor.

1,149,441. **Search or Headlight.** F. J. Heiberger, Jr., Boston, Mass., and M. C. Steuart, Richmond, Va. Motor for operating shield mounted upon head lamp.

1,149,447. **Trolley-Wheel Mount.** J. James,

Woodlawn, Pa. Sectionally formed harp and wheel.

1,149,453. Speed Indicator. W. J. Landon, Seattle, Wash. Indicator hand successively closes electric indicator circuits.

1,149,496. Relay. H. W. Cheney, assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis. For use with circuit breaker on polyphase circuits.

1,149,502 and 1,149,503. Mining Machine. C. E. Davis, assignor to Goodman Mfg. Co., Chicago, Ill. Mounting and gearing of motor.

1,149,529. Closet. A. McCary, assignor to Gould Coupler Co., New York, N. Y. Seat-controlled electric heater for heating bowl contents.

1,149,531. Automobile Signal. J. C. Marsh, Manchester, N. H. Pointer has transparent panels and is interiorly illuminated.

1,149,533. Coping-Head. F. R. Patch, Rutland, Vt. For coping machines; mounting and gearing of driving motor.

1,149,547. Apparatus for Enabling the Blind to Read. H. Tideman, Menominee, Mich. Stylus moved across record sheet makes circuit of telegraph instrument through code perforations. (See cut.)

1,149,558. Electrical Accumulator. C. de-Sedneff, Paris, France. Configuration of plate.

1,149,560. Ventilated Fixture. T. W Dixon, assignor of one-half to W. H White, St. Louis, Mo. Special structure of support for socket and globe.

1,149,561. Stop Means for Automatic Typewriters, Etc. P. J. Dreher, Toledo, O. Removal of last sheet from table opens hole through which switch for driving motor is pneumatically opened.

1,149,571. Train-Stop. H. M. Gain, Belleville, Ontario, Canada. Danger condition sets track contact to close circuit to apply brakes.

1,149,583. Signal Device and Projector Therefor. M. R. Hutchison, assignor to Lovell-McConnel Mfg. Co., Newark, N. J. Driving motor of siren mounted in horn and controlled by air pressure at mouth of horn.

1,149,586. Electric Switch. C. J. Klein, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Unit for snap switch comprising frame and contact mechanism therein.

1,149,592. Multiduct. T. E. Murray and A. V. McHarg, New York, N. Y., assignors to said Murray. Formed of sheet metal plates having number of longitudinal grooves secured together with grooves in register.

1,149,599. Junction or Terminal Block. H. Small, assignor to Vulcan Motor Devices Co., Philadelphia, Pa. Split sockets are clamped against plugs by drawing together blocks of insulation about them.

1,149,600. System of Motor Control. J. V. Smith, Louisville, Ky. Electromagnetically controlled and interlocked main, reversing and field switches.

1,149,601. Reversible Electric Motor. F. M. Spencer and G. W. Warnholz, San Francisco, and J. Wigmore, Oakland, Cal., assignors to Warnholz. Stationary and rotatable armatures in alinement, variable fields rotatable about armature and means for holding movable armature against rotation.

1,149,603. Protective Device for Busbar Circuits. P. Torchio and H. R. Woodrow, assignors to T. E. Murray, New York, N. Y. Generators tapped into inductances between main and distributing buses.

1,149,609. Safety Device for Moving-Picture Machines. E. M. Wooden, assignor to Perfectograph Mfg. Co., New York, N. Y. Operating level for mechanism returns to "off" position unless held by operator, the light switch being opened on such return.

1,149,610. Acoustic Apparatus for Detecting Sound Vibration in Non-Gaseous Media. D. W. Allis, assignor to Boston Talking Machine Co., Boston, Mass. Microphone contained in casing unaffected by sound vibrations except of bodies with which its casing is brought in contact.

1,149,614. Toll Telephone System. E. P. Baird, assignor to Baird Mfg. Co., Chicago, Ill. Toll device controls means for rendering receiver or transmitter inoperative.

1,149,631. Machine for Charging and Discharging Gas Retorts. H. A. Carpenter and R. L. Hibbard, assignors to Riter-Conley Mfg. Co., Pittsburgh, Pa. Travel circuit for the machine controlled by the charging mechanism.

1,149,651. Trolley Mechanism for Railway-Cars. C. Kaspar, Chicago, Ill. Vertically extensible pantograph supports wheel and horizontally extensible pantograph adapted to extend or contract vertical pantograph.

1,149,665. Electric Battery. F. N. Mason, Pittsburgh, Pa. Manner of assembling positive element, absorbent, and depolarizer in a dry cell.

1,149,666. Refillable Electric Battery. F. N. Mason. Modification of above.

1,149,701. Ductile Filament. O. M. Thowless, Newark, N. J. Refractory material is flashed on metal core, core is removed and resulting tube worked down to solid filament of proper size.

1,149,705. Search-Light for Firearms. E. S. Ward, assignor to Oregon Electric Gun Co., Inc., Portland, Oregon. Light and lens on barrel, battery in stock and circuit closed by push-pin when hammer is cocked.

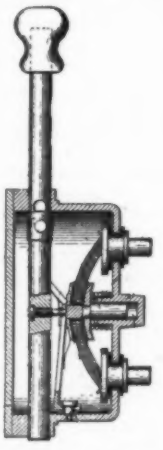
1,149,710. Heavy Oil Carbureter for Explosive Engines. M. Beck, Minneapolis, Minn. Electric fuel heater and thermo pile subjected to exhaust heat are alternately connected with storage battery by thermal switch controlled by combustion heat of engine.

1,149,721. Trolley Frog. W. H. Brown, Jerome, Pa. Has a detachable wearing plate.

1,149,735. Electric Switch. J. L. Creveling, assignor to Safety Car Heating and Lighting Co., New York, N. Y. Electromagnetic switch has series winding and two shunt windings one of which is cut out when switch is closed.

1,149,742. Automatic Elevator-Door Opening and Closing Apparatus. C. M. Einfeldt, Denver, Col. Electrically controlled hydraulic mechanism for operating doors closing shaft openings through floors.

1,149,746. Elevator Control Mechanism. F. M. Fitzgerald and R. S. Hatch, Chicago, Ill., assignors of one-third to F. M. Hatch. Main circuit switch in elevator-cab controlled by opening and closing of gates.



No. 1,149,755.—Switch.

1,149,755. Switch. G. W. Hart, assignor to The Hart Mfg. Co., Hartford, Conn. Sliding plunger cams laminated bridge at right angles against terminals. (See cut.)

1,149,758. Car Control System. F. Hedley, Yonkers, and J. S. Doyle, Mount Vernon, N. Y. Motor for operating car door controlled by momentum of car to prevent opening of door while car running.

1,149,759. Safety Platform Mechanism. F. Hedley and J. S. Doyle. Electrically operated mechanism for moving movable section of train landing platform toward train.

1,149,760. Automatic Safety Platform Mechanism. F. Hedley and J. S. Doyle. Movable section of platform automatically moved and controlled by train at platform. Related to above.

1,149,761. Automatic Control Mechanism for Safety Platforms. F. Hedley and J. S. Doyle. Related to above. Operation of movable section of platform dependent upon number of cars in train.

1,149,787. Circuit Closer. P. Sebock, Jr., Heatherman, W. Va. Push switch held closed by latch and released by electromagnet.

1,149,789. Means for Operating Switch Mechanisms. R. A. Schoenberg, assignor to Ida S. Rosenheim, New York, N. Y. Switch mechanism in lamp socket operated to open and close circuit by pushing inwardly on lamp.

1,149,798. Ignition Apparatus and System and Method of Spark Control. R. Varley, Englewood, N. J. Timer and generator armature relatively adjustable to maintain synchronism of timer and current phases.

1,149,817. Lamp Shade. T. D. Finizio, assignor to Kurz Electrical Co., Inc., New York, N. Y. Shade about bulb end and support secured at lamp base.

1,149,822. Sound-Amplifying Device. P. J. Hackett, assignor to Universal High Power Telephone Co., King County, Wash. Vibrations of telephone receiver diaphragm amplified by special construction.

1,149,843. Ignition Breaking Device. L. J. LePontois, assignor to Hurd & Haggin, Inc., New York, N. Y. Contacts opened by cam on generator shaft and electromagnet in circuit with generator winding.

1,149,852. Photographic-Printing Machine. F. W. Morton, Cedar Rapids, Iowa. Structure adapted for use with electric light.

1,149,866. Time-Controlled Electrical Contact Mechanism. A. L. Sohm, assignor to Sohm Electric Co., Chicago, Ill. Structure of contact device driven by second shaft of master clock.

1,149,874. System of Electrical Signaling. C. R. Underhill, assignor to Underhill Telegraph Translator Co., Jersey City, N. J. Electrically interrupted vibrations sent from a wireless telegraph transmitter in the form of signals are converted into electrically continuous signals at receiver.

1,149,913. Flash-Light. H. H. Hipwell and H. T. Hipwell, Pittsburgh, Pa. Tubular pocket lamp; details of switch.

1,149,933. Illuminated Match Stand and Automatic Electric Waiter-Signal. A. Martzolf, New York, N. Y. Comprises base and standard with electric lamp at top, battery and lever in base, the lever serving to connect and elevate the lamp.

1,149,971. Rectal Generator. J. B. Wagoner, deceased, by M. Wagoner, administratrix, San Francisco, Cal. Comprises tubular permanent magnet having specially formed knobs of insulation at each end and exposed dissimilar metals connected with said magnet but otherwise insulated.

1,149,973. Annunciator Fixture for Residences. E. E. Berthold, Chicago, Ill. Structure of plate having bell, push-button and speaking-tube mouth-piece.

1,149,974. Lithographic Plate and the Process for Producing the Same. C. Chisholm, San Francisco, Cal. Flexible celluloid base having thin layer of powdered copper imbedded in its surface upon which second layer of copper is electrolytically deposited and a thin layer of hard metal on this.

1,149,979. Universal Sound Transmitting Means. P. J. Hackett, assignor to Universal High Power Telephone Co. Structure for deflecting sound from a main receiving passage equally into a number of sound passages leading off from it.

1,149,980. Interrupter. C. Hartmann, assignor to Gould Coupler Co. Details of device normally closed and cam opened.

1,149,988. Gas Relief Device for Batteries. C. Staudt, assignor of one-half to C. Meder, New York, N. Y. Particular structure of plug providing gas vent from battery casing.

1,149,998. Dynamo Electric Generator. G. Inrig and L. Inrig, London, England. Armature has core movable into and out of coils by centrifugal governor to vary reluctance.

1,150,001. Electric Switch for Electric Lamps and the Like. A. H. Miller, Detroit, Mich. Details of thermostatic sign flashing switch.

1,150,005. Signal. W. K. Howe, assignor to General Railway Signal Co., Gates, N. Y. Details of electric interlocker signal.

Patents Expired.

The following United States electrical patents expired on August 16, 1915:

609,015 and 609,016. Electric Elevator. R. Eickemeyer, Yonkers, N. Y.

609,043. Motor Car. C. O. Palmer, Cleveland, Ohio.

609,092. Electric Controller. J. D. Forrer, Johnstown, Pa.

609,124. Electric Brake. E. B. Skinner, Ogden, Utah.

609,142. Combined Battery and Electric Cell. J. C. Dagoneau, Beaufort, France.

609,154. Electric Telegraphy. O. J. Lodge, Liverpool, England.

609,173. Telephone System. A. F. Swan, Bayonne, N. J.

609,188. Electrical Traction. W. Kingsland, Llandudno, England.

609,229. Telephone System. C. E. Egan, B. L. Lawton and E. C. Wilcox, Meriden, Conn.

609,245 to 609,249, inclusive. Electric Circuit-Controller. N. Tesla, New York, N. Y.

609,250. Electrical Ignition for Gas Engines. N. Tesla.

609,251. Electric Circuit-Controller. N. Tesla.

609,252. Electric Rail Bond. J. S. Tucker, Chicago, Ill.

609,274. System of Control of Electric Motors. E. R. Gill, Englewood, N. J.

609,288. Means for Fastening Insulator Pins to Crossarms. L. Mitchell, Augusta, Ga.

609,331. Telephonic Measured-Service System. W. W. Dean, Boston, Mass.

609,356. Electrical Conduit Box. H. Krantz, New York, N. Y.

609,374. Telephone Repeater or Relay. J. S. Stone, Boston, Mass.